



Thermakraft

Industries (NZ) Ltd

CI/SfB			
FEBRUARY 2005			

*This product does comply with Table 23 of E2
if you have any questions phone 0800 806595
ask for Mitchell*

DESIGNER AND USER GUIDELINES

THERMAKRAFT 215 BITUMINOUS SELF SUPPORTING ROOFING UNDERLAY

Product Description

Thermakraft 215 Bituminous Self Supporting Roofing Underlay is specifically designed for use in Domestic and Commercial type buildings.

Thermakraft 215 Bituminous Self Supporting Roofing Underlay will provide the following functions:

- 1) Permeable to water vapours.
- 2) Resistance to water and air penetration.
- 3) Resistance to dust and excessive air movement.
- 4) Is self supporting up to 1200mm rafter/purlin spacing.

Applications

Thermakraft 215 Bituminous Self Supporting Roofing Underlay provides the ideal temporary protection against wind, snow and rain prior to the application of the wall cladding or roofing material. It is ideally used to reduce condensation under roofing.

Care should be taken not to expose **Thermakraft 215 Bituminous Self Supporting Roofing Underlay** to continuous wet and windy conditions. Apply during mild conditions.

Note

Applications outside our recommendations or if unusual conditions exist the suitability of **Thermakraft 215 Bituminous Self Supporting Roofing Underlay** should be established by contacting a representative of **Thermakraft Industries (NZ) Ltd**.

Standard Roll Dimensions

Thermakraft 215 Bituminous Self Supporting Roofing Underlay is coloured black.

Rolls are girth wrapped and labelled with the company name and manufacture batch number.

Roll Sizes	1250mm x 40m	50m ²	18 kg
	1250mm x 20m	25m ²	9 kg (2 per pack)
	1450mm x 34.5m	50m ²	18 kg

Standards

Thermakraft 215 Bituminous Self Supporting Roofing Underlay complies with the requirements of AS/NZS 4200.1: 1994 Pliable Building Membranes and Underlays.

Durability

Thermakraft 215 Bituminous Self Supporting Roofing Underlay when in accordance with the approved document E2 of the Building Code and:

- is installed correctly.
- is not subjected to unreasonable conditions of exposure.
- is not damaged due to design defects.
- is not covered by faulty or thin sheathing.
- must not be exposed to the weather for more than 7 days.
- is not subjected to prolonged humidities in excess of 90% RH.

Thermakraft 215 Bituminous Self Supporting Roofing Underlay will last for 50 years.

THERMAKRAFT 215 Bituminous Self Supporting Roofing Underlay

Installation	Thermakraft 215 Bituminous Self Supporting Roofing Underlay may be run <u>vertically</u> over purlins with a 150mm lap. Fix securely to purlins with galvanised fixing clips. The membrane should be firmly laid to avoid excessive dishing between purlins. Avoid prolonged exposure by installing the roof immediately.	
NOTE:	However if used vertically individual runs should be limited to 10 metres. Thermakraft 215 Bituminous Self Supporting Roofing Underlay may be run <u>horizontally</u> across rafter/trusses with a 150mm lap, prior to fixing of purlins or battens. Secure to rafters/trusses using appropriate fixing clouts or clips. Avoid prolonged exposure by installing the roof immediately.	
NOTE:	To conform to NZS 3604: 1999 Section 11.2, underlays under an 8° pitch shall be laid horizontally and the upper sheets shall be lapped over the lower sheet on the roof.	
Availability	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is available from leading hardware and builders supplies merchants and roofing manufacturers. In case of difficulty contact our office toll free 0800-806-595 for assistance.	
Storage	Thermakraft 215 Bituminous Self Supporting Roofing Underlay should be stood on end and kept dry.	
Fire Retardancy	Thermakraft 215 Bituminous Self Supporting Roofing Underlay is a bitumen based product and is therefore not intended for use as a fire retardant product.	
Classification	In accordance With AS/NZS 4200.1 Duty: Heavy Flammability Index: Unclassified	
Technical Data	(As per AS/NZS 4200.1 and NZS 2295) Nominal Weight 370 g/m ² Tensile Strength MD 15.57 kN/m Tensile Strength CD 7.50 kN/m Edge Tear 99.8 N Ph Reaction 7.3 nominal Permeability 197 g/m ² / day Water Absorption 277 g/m ² nominal Water Penetration Pass	

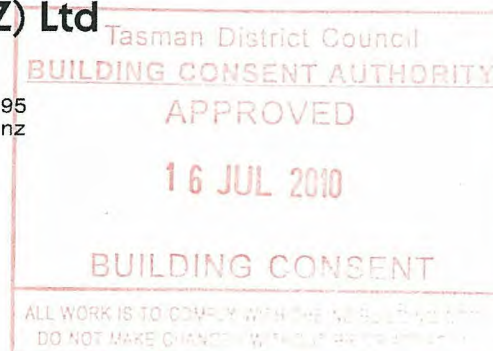
The information contained in this document is believed to be correct and accurate. However all due care should be exercised by those who use it. If in doubt contact a **Thermakraft Industries (NZ) Ltd** representative for advice. Care should be taken to ensure that fixing clips, nails and staples used with **Thermakraft 215 Bituminous Self Supporting Roofing Underlay** are of a type that will have a life of not less than 50 years.



Thermakraft Industries (NZ) Ltd

11 Turin Place, East Tamaki, Auckland, N.Z.
P.O. Box 58-112, Greenmount, Auckland.
Phone 09-273 3727 Fax 09-273 3726 Free Phone 0800 806 595
Email: sales@thermakraft.co.nz Website: www.thermakraft.co.nz

E. & O. E.



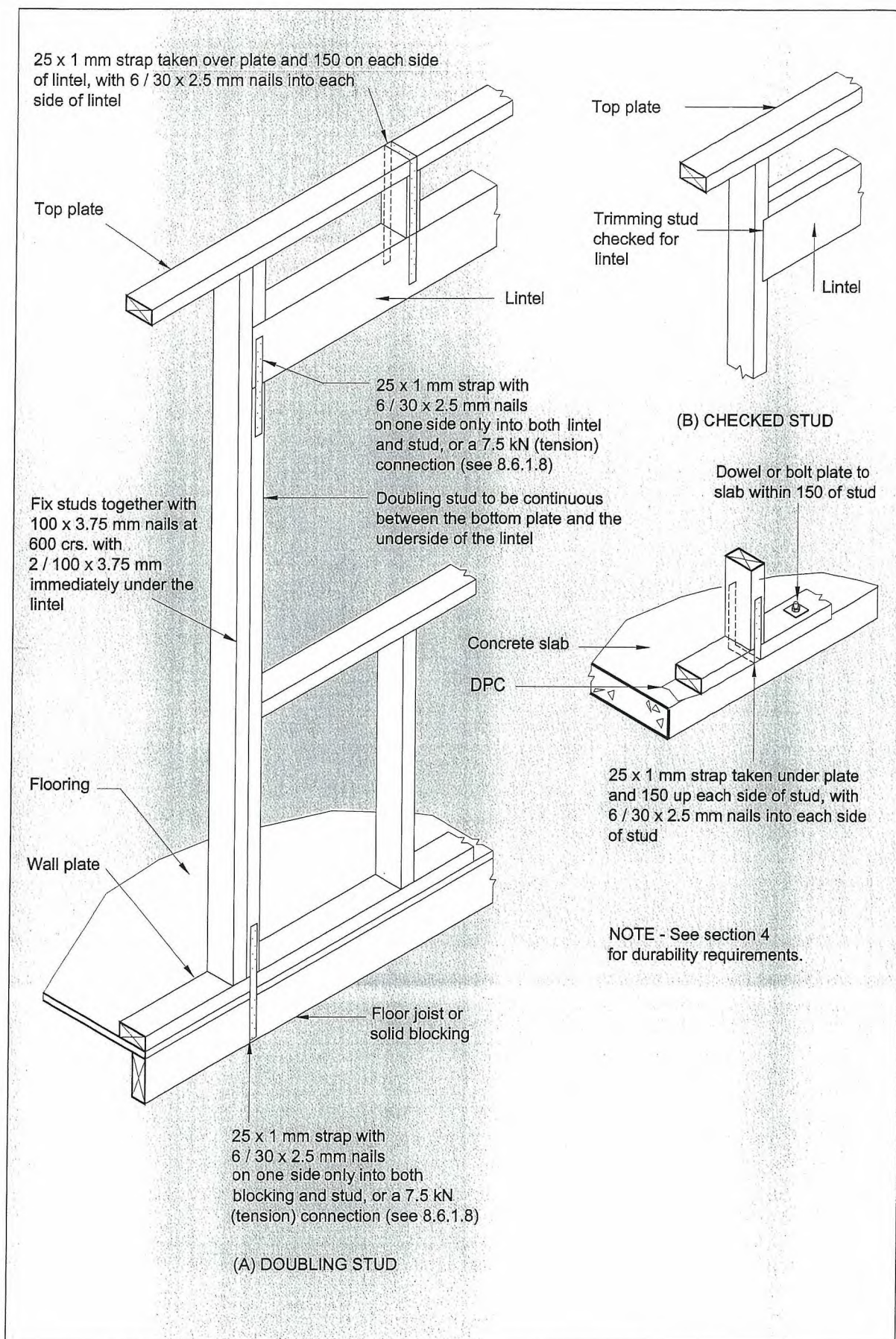
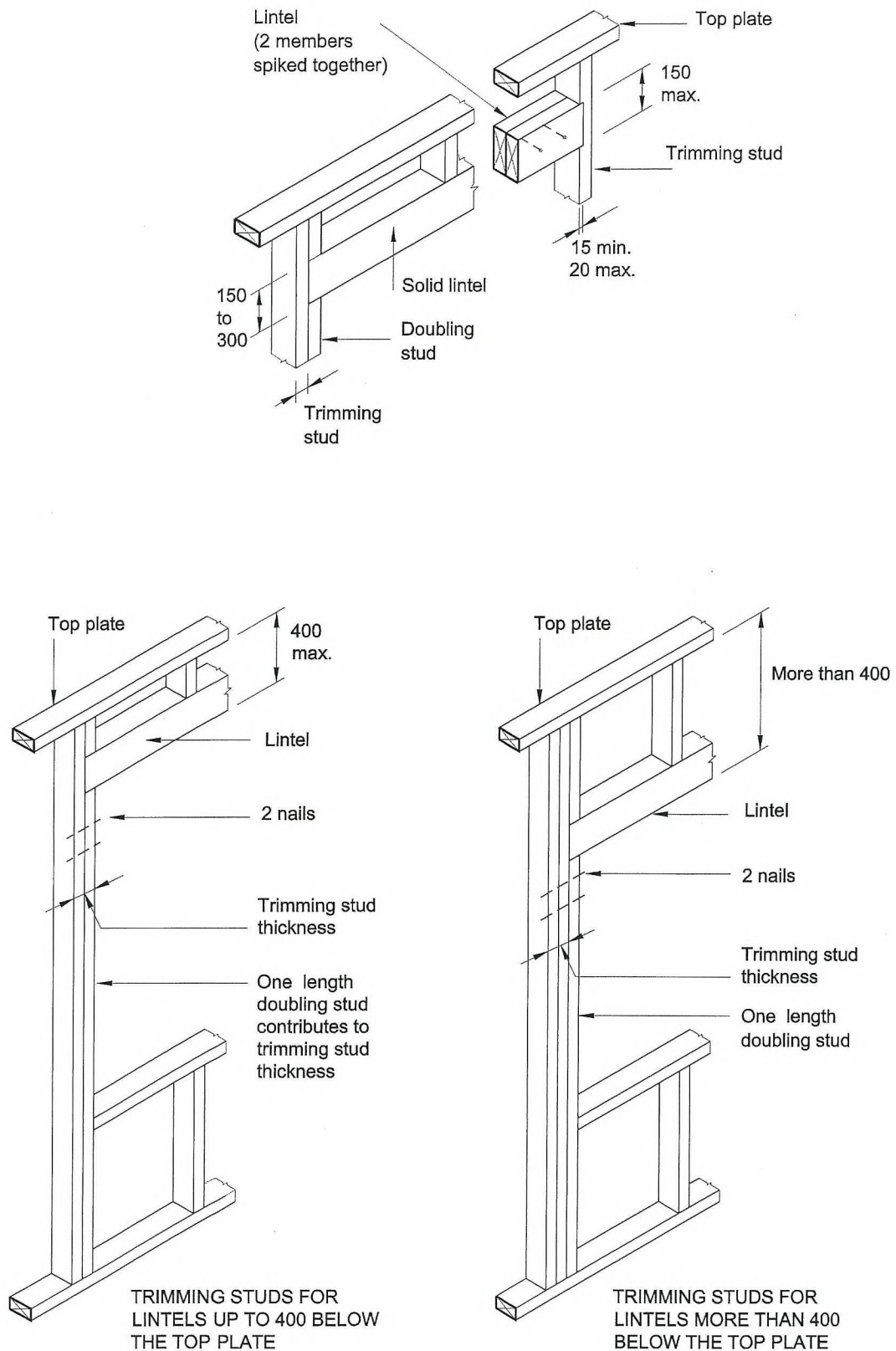


Figure 8.12 – Fixing of lintels to prevent uplift (see 8.6.1.8 and tables 8.14(A) and (B))



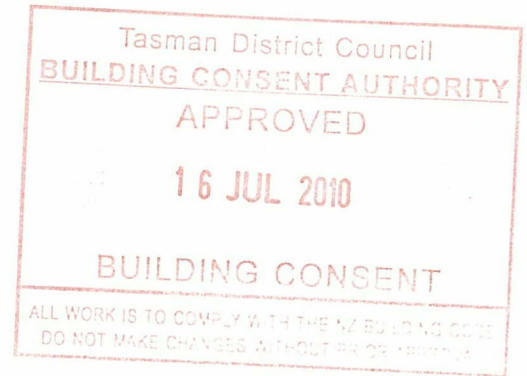
Amd 1
Dec '00

Figure 8.5 – Trimming studs and lintels (see 8.5.2.1)

GANGLAM



April 2008



GANG-NAIL® GANGLAM Manual

**The GANGLAM SYSTEM is available only through GANG-NAIL
Fabricators throughout New Zealand**

Refer to the MiTek New Zealand website for up to date GANGLAM SYSTEM information and
a GANG-NAIL Fabricator listing

www.mitek.nz.co.nz



© Copyright 2008 MiTek Holdings, Inc.
All rights reserved.



Producer Statement	2
Specification	3
Description	3
Testing	3
Sizes	3
Timber Specification	3
Storage and Handling	4
Strength	4
Deflection	4
Camber	4
Design Data	5
Multi-Span Beams	5
Selection Charts	6
Table 1: Lintels Supporting Roof and Ceiling Only	6
Table 2: Ridge Beam Supporting Roof and Sarking or Ceiling	7
Table 3: Lintel Supporting Roof and Load-bearing Wall	8
Table 4: Lintel Supporting Floor and Wall	9
Table 5: Cantilevered Lintel for Corner Bay under Hip Roof	10
Table 6: Cantilevered Lintel for Corner Bay under Gable Roof	11
Table 7A: Lintel Supporting Girder/Setback Trusses with Light Roof	12
Table 7B: Lintel Supporting Girder/Setback Trusses with Heavy Roof	13
Table 8A: Lintel Supporting Light Roof, Wall and Floor Joists	14
Table 8B: Lintel Supporting Heavy Roof, Wall and Floor Joists	15
Table 9A: 1.5 kPa L.L. Floor Beam Supporting Joists	16
Table 9B: 2.5 kPa L.L. Floor Beam Supporting Joists	16
Table 9C: 3.0 kPa L.L. Floor Beam Supporting Joists	16
Table 10: Longspan GANGLAM Floor Joists	17
Table 11A: GANGLAM Rafters for Light Weight Roof with No Ceiling	17
Table 11B: GANGLAM Rafters for Light Weight Roof with Ceiling	17
Table 11C: GANGLAM Rafters for Heavy Weight Roof with Ceiling	17
Fixing Details	18
Fixing Specifications	18
Site Connections	19
Construction Details	20

Producer Statement PS1- Design

ISSUED BY: MiTek New Zealand Ltd

TO BE SUPPLIED TO: Building Consent Authorities

IN RESPECT OF: GANGLAM SYSTEM Design Manual, April 2008

AT: Various Locations in New Zealand

MiTek New Zealand Ltd has provided engineering design services in respect of the requirements of Clause B1 of the Building Code for

☐ All

☒ Part only as specified – GANGLAM

The selection charts within this design manual have been prepared in accordance with the requirements of NZS 4203, NZS 3603 and NZS 3604, approved documents of the NZ Building Code and in accordance with sound and widely accepted engineering principles.

On behalf of **MiTek New Zealand Ltd**, and subject to:

1. Site verification of the design assumptions within this manual
2. All proprietary products meeting their performance specification requirements;

I BELIEVE ON REASONABLE GROUNDS that the use of GANGLAM in the drawings, specifications, and other documents according to which the building is proposed to be constructed will comply with the relevant provisions of the Building Code.

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

On behalf of MiTek New Zealand Ltd Date: April 2008



.....
In Ling Ng
Technical Services Manager
BE (Hons), CPEng, IntPE
MIPENZ (ID: 146585)

MiTek New Zealand Ltd.

AUCKLAND: 40 Neales Road, East Tamaki 2013 PO Box 58-014, Greenmount 2141 Ph: 09-274 7109 Fax: 09-274 7100
CHRISTCHURCH: 14 Pilkington Way, Wigram 8042 PO Box 8387, Riccarton 8440 Ph: 03-348 8691 Fax: 03-348 0314

Description

GANGLAM is a concept of building up large beam sections from smaller components by edge joining standard section sizes together with GANG-NAIL connector plates.

These shear plates are normally pressed onto one face with nominal stitch plates on the other face. In some cases, the plates can be totally concealed between the timber layers.

The GANGLAM system uses readily available materials and is quick to fabricate. This enables the product to be supplied with minimal delay and at minimal cost.

Each beam is custom made to measure, and can be cambered to suit any application. Extra deep or long multi-span beams can be detailed to requirements.

Testing

GANGLAM beams have been tested in the test laboratories of MiTek New Zealand Ltd and by the Forest Research Institute. Much of the evidence of performance has also been tested on site since its inception around 1981.

Sizes

Although GANGLAM beams may be constructed to any depth and width, the common sizes are as follows:

330 x 45	380 x 45	430 x 45
480 x 45	530 x 45	580 x 45

Wider beams are usually achieved by nailing 45mm layers side by side.

Sizes smaller than 2/330 x 45 can be 2/45mm wide solid timber components or 1/90mm wide solid timber component.

2/290 x 45 can be 2/290 x 45 GANGLAM or 2/290 x 45 solid timber or 290 x 90 solid timber.

Timber Specification

Normal: Minimum MSG8 mechanically stress graded or VSG8 visually graded.

Architectural: Select visually acceptable MSG or VSG Grade as above.

Treatment: Refer to NZS 3602.

Moisture Content: All GANGLAM beams are made dry, 18% or less at time of fabrication.

Size: Components are 45mm thick gauged timber.

Storage and Handling

Consideration for the storage and handling of GANGLAM beams are the same as for trusses in general. However particular care is required to ensure the beams stay dry by avoiding exposure to wet weather. Stacking is best done with fillets in between to allow air circulation. The beams are normally marked to identify the right way up and special load bearing points if any. **GANGLAM beams are not suitable for applications exposed to the weather.**

Strength

The tables have been designed to the limit state design provisions of NZS 3603 (Amendment 4), NZS 3604 and NZS 4203. Some of the criteria are highlighted as follows (based on MSG8 timber):

Bending Strength - f_b 14.0 MPa (MSG8)	
Duration of Load Factor - k_1 0.6 (Dead only)	0.8 (Floor Live Load) 1.0 (Wind, Seismic and Roof Live Load)
Modulus of Elasticity - E - E_{lb}	8.0 GPa (GANGLAM) 5.4 GPa (Solid Sawn Timber)
Creep Factor - k_2 2.2 (GANGLAM)	2.0 (Solid Swan Timber)

Deflection

The tables have been designed in general compliance with BRANZ Guidelines for the Structural engineering Design of Houses, namely:

Long-term Deflection $L/300$	but not greater than 15mm
Short-term Deflection $L/400$	but not greater than 12mm for liveliness control

Camber

GANGLAM beams should be cambered $SPAN/300$ but not exceeding 24mm at mid-span between supports. Jig with additional camber to achieve specified camber when released. Beams should be marked to indicate the right way up. No camber is required for cantilever beams.

Design Data

The tables herein have been designed according to the following loads:

Roof	LOAD EXAMPLE	DISTRIBUTED	CONCENTRATED	
Dead Load	Light Weight Roof		0.25 kPa	
		Heavy Weight Roof	0.65 kPa	
		Ceiling	0.20 kPa	
Live Load	Maintenance Load	0.25 kPa 1.0kN		

Note: 1) 750mm overhang has been included in the derivation of the tables.
 2) Spans are horizontal measurements.
 3) For heavy roofs over 30 degree pitch, multiply the roof span by 1.17 before using the tables:

$$\text{Nominal Roof Span} = 1.17 \times \text{Actual Roof Span}$$

Floor	LOAD EXAMPLE	DISTRIBUTED	CONCENTRATED	
Dead Load	Particle board floor		0.5 kPa	
		(including ceiling)		
Live Load	Domestic		1.5 kPa	1.8kN
		Offices for general use	2.5 kPa	2.7kN
		Assembly areas, fixed seating	3.0 kPa	2.7kN

Wall Dead Load = 0.6 kN/m line load

Snow 0.5 kPa snow load has been allowed in the tables. For higher snow loads up to 1.0 kPa, multiply the actual roof span by the figure below before using the tables:

$$\text{Light Roof: Nominal Roof Span} = 1.53 \times \text{Actual Roof Span}$$

$$\text{Heavy Roof: Nominal Roof Span} = 1.53 \times \text{Actual Roof Span}$$

Wind Design covers Very High Wind Zones as in NZS 3604:1999 unless stated otherwise.

Multi-Span Beams

Beam spans selected from the tables may be increased by 10% in multi-span situations. The length of the shorter span must not be less than half the longer span.

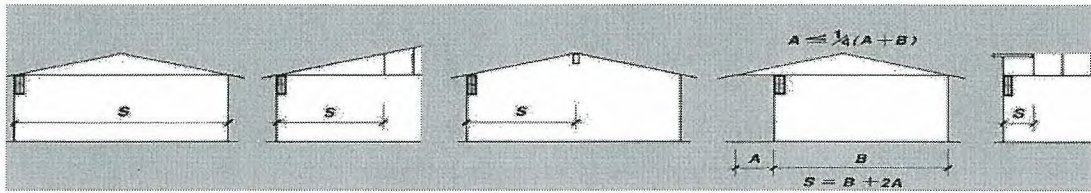


TABLE 1:
LINTEL SUPPORTING ROOF AND CEILING ONLY

		LINTEL SIZE	MAXIMUM LINTEL SPAN (m)														
			SUPPORTED ROOF SPAN 'S' (m)														
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0				
LIGHT ROOF	SOLID TIMBER	2/90 x 45	1.38	1.32	1.27	1.22	1.18	1.14	1.11					1.06	1.03	0.99	0.96
		2/115 x 45	1.85	1.76	1.69	1.63	1.57	1.53	1.47					1.42	1.37	1.32	1.28
		2/140 x 45	2.15	2.05	1.97	1.90	1.84	1.78	1.72					1.65	1.60	1.54	1.50
		2/190 x 45	2.92	2.79	2.67	2.58	2.49	2.42	2.33					2.25	2.17	2.10	2.03
		2/240 x 45	3.51	3.39	3.29	3.20	3.12	3.05	2.95					2.84	2.74	2.65	2.57
		2/290 x 45		3.94		3.81		3.69		3.59	3.50	3.42	3.35	3.29	3.19	3.09	2.99
	GANGLAM	2/330 x 45		4.76		4.60		4.45		4.33	4.22	4.13	4.04	3.97	3.90	3.83	3.77
		2/380 x 45		5.29		5.11		4.95		4.82	4.70	4.59	4.50	4.41	4.33	4.26	4.19
		2/430 x 45		5.81		5.60		5.43		5.28	5.15	5.04	4.93	4.84	4.75	4.67	4.60
		2/480 x 45		6.31		6.09		5.90		5.74	5.60	5.47	5.36	5.26	5.16	5.08	5.00
		2/530 x 45		6.80		6.56		6.35		6.18	6.03	5.89	5.77	5.66	5.56	5.47	5.38
		2/580 x 45		7.27		7.02		6.80		6.61	6.45	6.30	6.17	6.06	5.95	5.78	5.60
HEAVY ROOF	SOLID TIMBER	2/90 x 45	1.12	1.07	1.02	0.99	0.95	0.93	0.90					0.88	0.86	0.83	0.81
		2/115 x 45	1.49	1.42	1.37	1.32	1.27	1.23	1.20					1.17	1.14	1.11	1.08
		2/140 x 45	1.74	1.66	1.59	1.54	1.48	1.44	1.40					1.37	1.33	1.30	1.26
		2/190 x 45	2.36	2.25	2.16	2.08	2.01	1.95	1.90					1.85	1.81	1.76	1.70
		2/240 x 45	2.99	2.85	2.73	2.63	2.55	2.47	2.40					2.34	2.29	2.22	2.15
		2/290 x 45		3.36		3.25		3.15		3.06	2.97	2.88	2.80	2.73	2.67	2.59	2.51
	GANGLAM	2/330 x 45		4.06		3.92		3.80		3.70	3.60	3.52	3.45	3.38	3.32	3.27	3.19
		2/380 x 45		4.52		4.36		4.22		4.11	4.01	3.92	3.84	3.76	3.70	3.63	3.58
		2/430 x 45		4.96		4.78		4.63		4.51	4.40	4.30	4.21	4.13	4.05	3.99	3.93
		2/480 x 45		5.38		5.19		5.03		4.89	4.77	4.67	4.57	4.48	4.40	4.33	4.26
		2/530 x 45		5.80		5.59		5.42		5.27	5.14	5.03	4.92	4.83	4.74	4.66	4.59
		2/580 x 45		6.20		5.98		5.80		5.64	5.50	5.38	5.27	5.17	5.07	4.99	4.91

= regular duty plating

= heavy duty plating

= super heavy duty plating

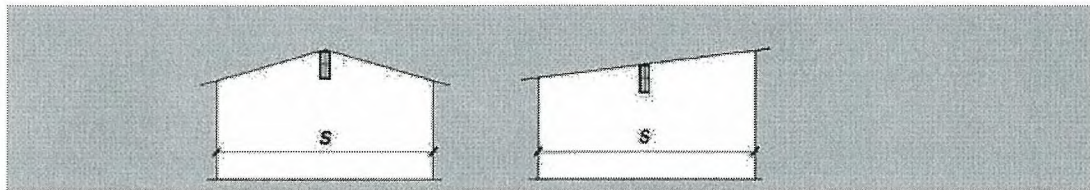


TABLE 2:
RIDGE BEAM SUPPORTING ROOF AND SARKING OR CEILING (RAFTERS @ 1200mm MAX CRS)

		LINTEL SIZE	MAXIMUM LINTEL SPAN (m)											
			SUPPORTED ROOF SPAN 'S' (m)											
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
LIGHT ROOF	SOLID TIMBER	2/190 x 45	3.19	3.00	2.85	2.73	2.62	2.53	2.45	2.38	2.29	2.21	2.13	
		2/240 x 45	4.03	3.79	3.60	3.44	3.31	3.20	3.10	3.01	2.89	2.79	2.69	
		2/290 x 45	4.66	4.42	4.20	4.02	3.86	3.73	3.61	3.51	3.37	3.25	3.14	
	GAVGLAM	2/330 x 45	5.63	5.38	5.17	5.00	4.86	4.73	4.61	4.42	4.24	4.09	3.95	
		2/380 x 45	6.26	5.98	5.75	5.56	5.40	5.26	5.14	5.03	4.89	4.71	4.55	
		2/430 x 45	6.86	6.56	6.31	6.10	5.93	5.77	5.64	5.52	5.41	5.31	5.15	
		2/480 x 45	7.45	7.12	6.85	6.63	6.44	6.27	6.12	5.99	5.87	5.76	5.66	
		2/530 x 45	8.03	7.67	7.38	7.14	6.93	6.75	6.59	6.45	6.32	6.21	6.10	
2/580 x 45	8.59	8.21	7.90	7.64	7.42	7.22	7.05	6.90	6.77	6.64	6.53			
HEAVY ROOF	SOLID TIMBER	2/190 x 45	2.58	2.43	2.31	2.21	2.12	2.05	1.98	1.93	1.88	1.83	1.79	
		2/240 x 45	3.26	3.07	2.91	2.79	2.68	2.59	2.51	2.43	2.37	2.31	2.26	
		2/290 x 45	3.80	3.58	3.40	3.25	3.13	3.02	2.92	2.84	2.77	2.70	2.63	
	GAVGLAM	2/330 x 45	4.80	4.59	4.37	4.18	4.02	3.88	3.76	3.65	3.56	3.43	3.31	
		2/380 x 45	5.34	5.10	4.91	4.75	4.61	4.47	4.33	4.21	4.09	3.95	3.82	
		2/430 x 45	5.86	5.59	5.38	5.21	5.06	4.92	4.81	4.70	4.61	4.47	4.32	
		2/480 x 45	6.36	6.08	5.85	5.65	5.49	5.35	5.22	5.11	5.01	4.92	4.82	
		2/530 x 45	6.85	6.54	6.30	6.09	5.91	5.76	5.62	5.50	5.39	5.30	5.20	
2/580 x 45	7.33	7.00	6.74	6.52	6.33	6.16	6.02	5.89	5.77	5.67	5.57			

= regular duty plating

= heavy duty plating

= super heavy duty plating

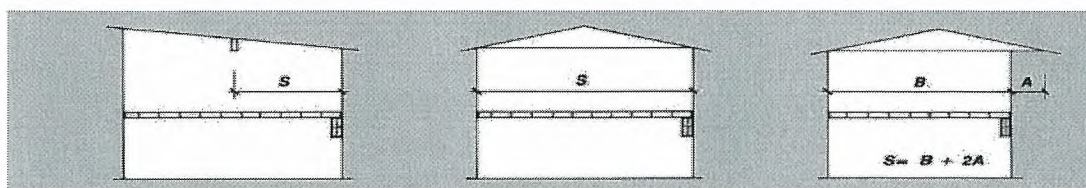


TABLE 3:
LINTEL SUPPORTING ROOF AND LOAD-BEARING WALL (2.4m MAX WALL HEIGHT)

		LINTEL SIZE	MAXIMUM LINTEL SPAN (m)											
			SUPPORTED ROOF SPAN 'S' (m)											
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
LIGHT ROOF	SOLID TIMBER	2/90 x 45	1.15	1.11	1.09	1.05	1.04	1.02	1.00	0.98	0.95	0.92	0.90	
		2/115 x 45	1.53	1.49	1.45	1.41	1.38	1.35	1.33	1.30	1.27	1.23	1.20	
		2/140 x 45	1.78	1.73	1.69	1.65	1.61	1.58	1.55	1.52	1.48	1.44	1.40	
		2/190 x 45	2.42	2.35	2.29	2.24	2.19	2.14	2.10	2.05	2.01	1.95	1.90	
		2/240 x 45	3.05	2.97	2.89	2.83	2.76	2.71	2.65	2.61	2.54	2.47	2.40	
		2/290 x 45	3.42	3.35	3.29	3.23	3.18	3.13	3.08	3.04	2.96	2.88	2.80	
	GANGLAM	2/330 x 45	4.13		4.05		3.97		3.90		3.83		3.77	3.72
		2/380 x 45	4.59		4.50		4.41		4.33		4.26		4.20	4.13
		2/430 x 45	5.04		4.94		4.84		4.76		4.68		4.60	4.54
		2/480 x 45	5.47		5.36		5.26		5.16		5.08		5.00	4.93
		2/530 x 45	5.89		5.77		5.66		5.56		5.47		5.39	5.31
		2/580 x 45	6.31		6.18		6.06		5.95		5.85		5.76	5.68
HEAVY ROOF	SOLID TIMBER	2/90 x 45	1.00	0.97	0.94	0.91	0.89	0.86	0.84	0.82	0.80	0.78	0.76	
		2/115 x 45	1.33	1.29	1.25	1.21	1.18	1.15	1.13	1.10	1.07	1.04	1.01	
		2/140 x 45	1.56	1.50	1.46	1.41	1.38	1.34	1.31	1.28	1.25	1.21	1.18	
		2/190 x 45	2.11	2.04	1.98	1.92	1.87	1.82	1.78	1.74	1.69	1.64	1.60	
		2/240 x 45	2.67	2.58	2.50	2.43	2.36	2.31	2.25	2.20	2.13	2.07	2.02	
		2/290 x 45	3.09	3.00	2.91	2.83	2.76	2.69	2.63	2.57	2.49	2.42	2.36	
	GANGLAM	2/330 x 45	3.73		3.64		3.55		3.48		3.41		3.35	3.29
		2/380 x 45	4.15		4.04		3.95		3.86		3.79		3.72	3.66
		2/430 x 45	4.55		4.43		4.33		4.24		4.16		4.08	4.01
		2/480 x 45	4.94		4.82		4.70		4.60		4.51		4.43	4.36
		2/530 x 45	5.32		5.19		5.07		4.96		4.86		4.77	4.69
		2/580 x 45	5.70		5.55		5.42		5.31		5.20		5.11	5.02

= regular duty plating

= heavy duty plating

= super heavy duty plating

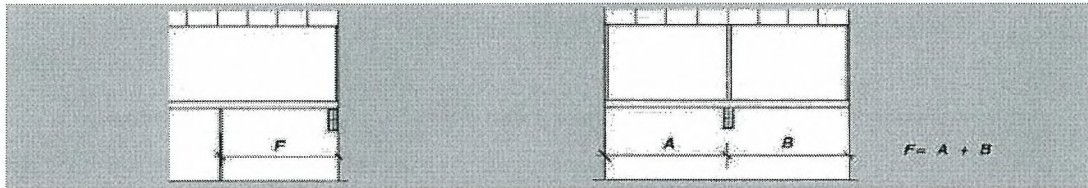


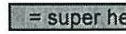
TABLE 4:
LINTEL SUPPORTING FLOOR AND WALL (2.4m MAX WALL HEIGHT)

	LINTEL SIZE	MAXIMUM LINTEL SPAN (m)											
		FLOOR SPAN F (m)											
		2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4	
SOLID TIMBER	2/90 x 45	1.07	1.05	1.04	1.03	1.01	0.96	0.92					0.88 0.85 0.82 0.80
	2/115 x 45	1.53	1.47	1.42	1.38	1.34	1.28	1.23					1.18 1.13 1.10 1.06
	2/140 x 45	1.78	1.72	1.66	1.61	1.57	1.49	1.43					1.37 1.32 1.28 1.24
	2/190 x 45	2.42	2.33	2.26	2.19	2.13	2.03	1.94					1.86 1.80 1.74 1.68
	2/240 x 45	3.05	2.94	2.85	2.76	2.69	2.56	2.45					2.36 2.27 2.19 2.12
GANGLAM	2/290 x 45	3.42	3.33	3.25	3.18	3.11	2.99	2.86					2.75 2.65 2.56 2.48
	2/330 x 45		4.13	4.02		3.92	3.83	3.76	3.68	3.60	3.46	3.33	3.22 3.12
	2/380 x 45		4.59	4.47		4.36	4.26	4.18	4.10	4.02	3.96	3.84	3.71 3.59
	2/430 x 45		5.04	4.90		4.78	4.68	4.58	4.49	4.42	4.34	4.28	4.19 4.06
	2/480 x 45		5.47	5.32		5.19	5.08	4.97	4.88	4.79	4.72	4.64	4.58 4.51
	2/530 x 45		5.89	5.74		5.59	5.47	5.36	5.26	5.16	5.08	5.00	4.93 4.86
	2/580 x 45		6.31	6.14		5.99	5.85	5.73	5.62	5.53	5.44	5.35	5.27 5.20

NOTE: THESE LINTELS DO NOT SUPPORT LOADS FROM OTHER BEAMS OR RAFTERS

 = regular duty plating

 = heavy duty plating

 = super heavy duty plating

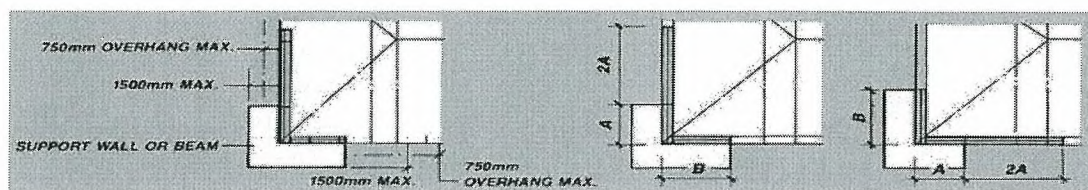


TABLE 5:
CANTILEVERED LINTEL FOR CORNER BAY UNDER HIP ROOF

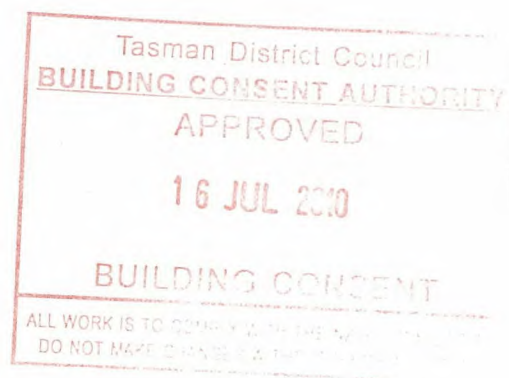
		LINTEL SIZE 1.8 2.4 3.0 3.6 4.2 4.8	MAXIMUM CANTILEVER (DIMENSION A) (m)						
			SUPPORTED LINTEL SPAN (DIMENSION B) (m)						
LIGHT ROOF	SOLID TIMBER	2/90 x 45 -----							
		2/115 x 45 -----							
		2/140 x 45 0.64 ----							
		2/190 x 45 0.99 0.83 0.66 ---							
		2/240 x 45 1.38 1.16 0.99 0.89 0.78 0.69							
		2/290 x 45 1.70 1.44 1.23 1.14 1.05 0.93							
GANG-LAM	2/330 x 45	2.40	2.05	1.77	1.65	1.55	1.44		
	2/380 x 45	2.89	2.50	2.17	2.02	1.90	1.79		
	2/430 x 45	3.28	2.96	2.58	2.41	2.27	2.15		
HEAVY ROOF	SOLID TIMBER	2/90 x 45 -----							
		2/115 x 45 -----							
		2/140 x 45 -----							
		2/190 x 45 0.73 0.61 ----							
		2/240 x 45 1.02 0.85 0.72 0.63 --							
		2/290 x 45 1.27 1.06 0.91 0.84 0.75 0.66							
	GANG-LAM	2/330 x 45	1.80	1.52	1.31	1.21	1.13	1.03	
		2/380 x 45	2.18	1.86	1.60	1.49	1.39	1.30	
		2/430 x 45	2.57	2.21	1.91	1.78	1.67	1.55	

NOTE: 1) CHOOSE OPTION WHERE 'A' IS LESS THAN 'B'
2) LINTEL 'B' TO BE SELECTED FROM TABLE 1

= regular duty plating

= heavy duty plating

= super heavy duty plating



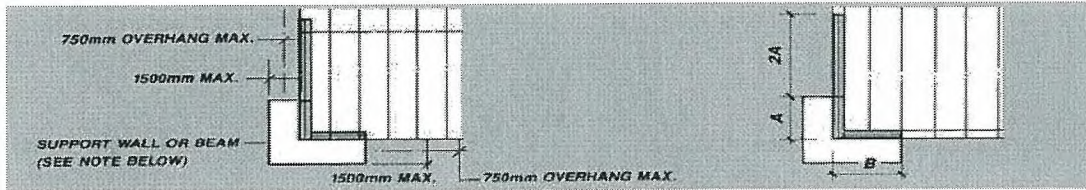
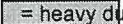


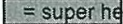
TABLE 6:
CANTILEVERED LINTEL FOR CORNER BAY UNDER GABLE ROOF

		LINTEL SIZE	DIMENSION B (m)	MAXIMUM CANTILEVER (DIMENSION A) (m)									
				TRUSS SPAN (m)									
				3.0	5.0	7.0	9.0	10.0	11.0	13.0	15.0		
LIGHT ROOF	SOLID TIMBER	2/140 x 45 3.0	0.55 0.41 0.33	-----									
		4.0	0.44	0.32	-----								
		5.0	0.37	-----									
		2/190 x 45 3.0	0.86 0.74 0.59 0.49 0.45	0.42 0.37									
		4.0	0.77	0.58 0.46 0.38 0.35	---								
		5.0	0.66	0.48 0.38 0.31	---								
		2/240 x 45 3.0	1.21 1.05 0.93						0.78 0.72	0.67 0.58	0.52		
		4.0	1.08	0.92 0.73 0.60 0.55 0.51	0.45 0.39								
		5.0	0.99	0.76 0.60 0.49 0.45 0.42	0.36 0.32								
		2/290 x 45 3.0	1.50 1.31 1.17						1.05 0.97	0.90 0.78	0.70		
		4.0	1.35	1.16 0.98 0.81 0.75 0.69	0.60 0.54								
		5.0	1.23	1.02 0.80 0.66 0.61 0.56	0.49 0.43								
HEAVY ROOF	SOLID TIMBER	2/330 x 45	3.0	2.13	1.87	1.69	1.55	1.49	1.39	1.22	1.09		
		4.0		1.93	1.67	1.50	1.26	1.16	1.08	0.94	0.83		
		5.0		1.77	1.53	1.24	1.03	0.95	0.88	0.76	0.68		
		2/380 x 45	3.0	2.59	2.29	2.07	1.90	1.83	1.75	1.54	1.38		
		4.0		2.35	2.05	1.84	1.59	1.47	1.37	1.20	1.06		
		5.0		2.17	1.87	1.57	1.31	1.20	1.12	0.97	0.86		
	GANGLAM	2/140 x 45 3.0	0.40 0.29	-----									
		4.0	0.31	-----									
		5.0	0.26	-----									
		2/190 x 45 3.0	0.63 0.53 0.42 0.35	---									
		4.0	0.56	0.41 0.33	-----								
		5.0	0.47	0.34	-----								
		2/240 x 45 3.0	0.89 0.77 0.66						0.55 0.51	0.47 0.41	0.37		
		4.0	0.79	0.65 0.52					0.43 0.39	0.36	---		
		5.0	0.72	0.54 0.42 0.35	---								
		2/290 x 45 3.0	1.11 0.96 0.86						0.75 0.69	0.64 0.56	0.50		
		4.0	0.99	0.85 0.70 0.58 0.53 0.49	0.43 0.38								
		5.0	0.91	0.73 0.57 0.47 0.43 0.40	0.35 0.31								
	GANGLAM	2/330 x 45	3.0	1.59	1.38	1.24	1.13	1.06	0.99	0.87	0.77		
		4.0		1.43	1.23	1.08	0.89	0.82	0.76	0.67	---		
		5.0		1.31	1.02	0.89	0.73	0.67	---				
		2/380 x 45	3.0	1.93	1.69	1.52	1.39	1.34	1.25	1.10	0.98		
		4.0		1.75	1.51	1.35	1.14	1.05	0.97	0.85	0.75		
		5.0		1.60	1.33	1.12	0.93	0.85	0.79	---			

NOTE: 1) CHOOSE OPTION WHERE 'A' IS LESS THAN 'B'
2) LINTEL 'B' TO BE SELECTED FROM TABLE 1

 = regular duty plating

 = heavy duty plating

 = super heavy duty plating

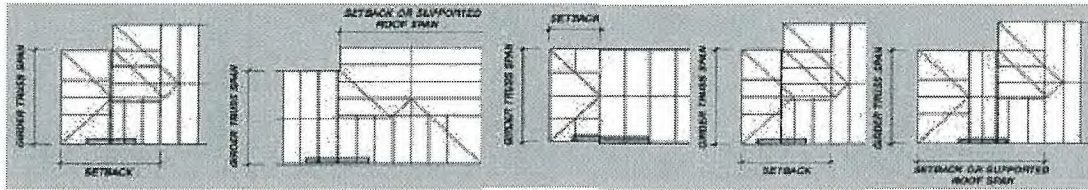


TABLE 7A:

LINTEL SUPPORTING GIRDER / SETBACK TRUSSES WITH LIGHT ROOF

	LINTEL SIZE	SETBACK (m)	MAXIMUM LINTEL SPAN (m)															
			GIRDER TRUSS SPAN (m)															
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
SOLID TIMBER	2/140 x 45	1.2	2.14	2.031	1.951	1.811	1.701	1.601	1.51	1.43	1.36	1.301	1.24	1.361	1.251	1.151	1.07	0.890.84
		2.4	1.83	1.641	1.49									1.050.960	0.880.81	0.75	0.70	0.660.62
		3.6	1.50	1.321	1.17									0.850.770	0.700.64	0.59	0.55	0.510.48
		4.8	1.25	1.080.95														
SOLID TIMBER	2/190 x 45	1.2	2.83	2.732	2.652	2.582	2.512	2.382	2.26	2.16	2.06	1.981	1.90	2.131	1.981	1.851	1.73	1.461.39
		2.4	2.64	2.532	2.31									1.741.601	1.471.37	1.28	1.20	1.131.06
		3.6	2.38	2.121	1.91									1.451.321	1.211.11	1.03	0.97	0.900.85
		4.8	2.05	1.801.61														
SOLID TIMBER	2/240 x 45	1.2	3.41	3.303	3.203	3.123	3.042	2.972	2.91	2.85	2.78	2.672	2.57	2.902	2.762	2.592	2.44	2.31
		2.4	3.21	3.092	2.99									2.492	2.302	2.141	1.99	1.87
		3.6	3.05	2.922	2.72									2.131	1.951	1.801	1.67	1.55
		4.8	2.91	2.612	2.34													
SOLID TIMBER	2/290 x 45	1.2	3.97	3.843	3.733	3.633	3.543	3.463	3.39	3.33	3.27	3.213	3.16	3.403	3.13	2.933	2.81	2.732
		2.4	3.76	3.623	3.50									3.213	2.952	2.842	2.67	2.51
		3.6	3.59	3.443	3.32									2.862	2.642	2.442	2.27	2.13
		4.8	3.44	3.293	3.13									2.522	2.302	2.121	1.97	1.83
SOLID TIMBER	2/290 x 45	6.0	3.31	3.092	2.78									2.171	1.981	1.811	1.67	1.55
		7.5	3.09	2.712	2.42													
		10.0	2.58	2.231	1.97									1.751	1.581	1.441	1.32	1.22
GANGLAM	2/330 x 45	1.2		4.70		4.56		4.43		4.31		4.21		4.12		4.04		3.96
		2.4		4.49		4.33		4.19		4.07		3.97		3.87		3.79		3.71
		3.6		4.30		4.14		4.00		3.87		3.76		3.67		3.55		3.35
		4.8		4.14		3.97		3.83		3.70		3.54		3.30		3.09		2.74
		6.0		4.00		3.83		3.68		3.42		3.15		2.92		2.72		2.54
		7.5		3.84		3.67		3.32		3.01		2.75		2.53		2.34		2.18
		10.0		3.56		3.11		2.75		2.47		2.24		2.05		1.89		1.75
	2/380 x 45	1.2		5.26		5.09		4.95		4.83		4.71		4.61		4.52		4.44
		2.4		5.04		4.86		4.71		4.58		4.46		4.36		4.26		4.17
		3.6		4.84		4.66		4.50		4.37		4.25		4.14		4.04		3.96
		4.8		4.67		4.49		4.33		4.19		4.07		3.96		3.82		3.60
		6.0		4.52		4.33		4.17		4.03		3.91		3.64		3.40		3.19
		7.5		4.36		4.16		4.00		3.77		3.46		3.19		2.97		2.60
		10.0		4.12		3.91		3.49		3.15		2.86		2.63		2.42		2.25
	2/430 x 45	1.2		5.79		5.61		5.46		5.32		5.20		5.09		4.99		4.90
		2.4		5.57		5.38		5.21		5.07		4.94		4.83		4.72		4.63
		3.6		5.37		5.17		5.00		4.85		4.72		4.60		4.50		4.40
		4.8		5.19		4.99		4.81		4.66		4.53		4.41		4.30		4.21
		6.0		5.03		4.83		4.65		4.50		4.36		4.24		4.11		3.87
		7.5		4.86		4.65		4.47		4.32		4.18		3.90		3.63		3.40
		10.0		4.61		4.39		4.22		3.86		3.53		3.24		3.00		2.80
	2/480 x 45	1.2		6.31		6.12		5.95		5.80		5.67		5.55		5.44		5.34
		2.4		6.08		5.88		5.70		5.54		5.41		5.28		5.17		5.07
		3.6		5.88		5.66		5.48		5.32		5.18		5.05		4.94		4.83
		4.8		5.70		5.48		5.29		5.12		4.98		4.85		4.74		4.63
		6.0		5.53		5.31		5.12		4.95		4.81		4.68		4.56		4.46
		7.5		5.35		5.12		4.93		4.76		4.62		4.49		4.29		4.02
		10.0		5.09		4.85		4.66		4.49		4.19		3.87		3.59		3.35
	2/530 x 45	1.2		6.81		6.61		6.43		6.27		6.13		6.00		5.89		5.78
		2.4		6.58		6.37		6.18		6.01		5.86		5.73		5.61		5.50
		3.6		6.38		6.15		5.95		5.78		5.63		5.49		5.37		5.26
		4.8		6.19		5.95		5.75		5.58		5.42		5.28		5.16		5.05
		6.0		6.02		5.78		5.58		5.40		5.24		5.10		4.98		4.87
		7.5		5.83		5.59		5.38		5.20		5.04		4.90		4.78		4.66
		10.0		5.55		5.31		5.10		4.92		4.76		4.51		4.19		3.92
	2/580 x 45	1.2		7.31		7.09		6.90		6.73		6.58		6.44		6.32		6.21
		2.4		7.07		6.84		6.64		6.46		6.31		6.17		6.04		5.92
		3.6		6.86		6.62		6.41		6.23		6.07		5.92		5.79		5.67
		4.8		6.67		6.42		6.21		6.02		5.86		5.71		5.58		5.46
		6.0		6.50		6.24		6.03		5.84		5.67		5.52		5.39		5.27
		7.5		6.30		6.04		5.82		5.63		5.46		5.31		5.18		5.06
		10.0		6.02		5.75		5.53		5.33		5.17		5.02		4.81		4.50

= regular duty plating

= heavy duty plating

= super heavy duty plating

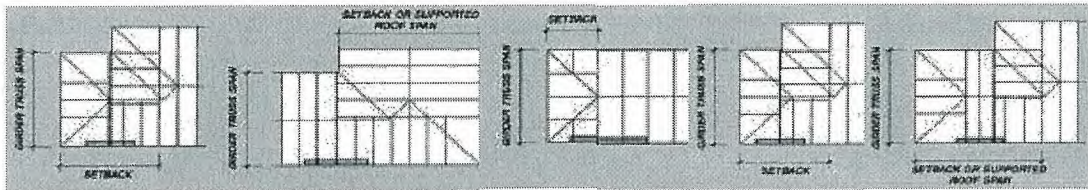


TABLE 7B:
LINTEL SUPPORTING GIRDER / SETBACK TRUSSES WITH HEAVY ROOF

	LINTEL SIZE	SETBACK (m)	MAXIMUM LINTEL SPAN (m)															
			GIRDER TRUSS SPAN (m)								SETBACK TRUSS SPAN (m)							
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
SOLID TIMBER	2/140 x 45 1.2	1.68	1.59	1.52						1.45	1.36	1.27	1.20	1.13	1.06	1.02	0.98	
	2.4	1.44	1.31	1.15						1.05	0.96	0.88	0.82	0.76	0.71	0.67	0.63	
	3.6	1.15	1.00	0.88						0.79	0.72	0.66	0.60	0.56	0.52	0.49	0.46	
	4.8	0.94	0.81	0.71						0.63	0.57	0.52	0.47	0.44	0.40	0.38	0.35	
	2/190 x 45 1.2	2.38	2.26	2.16						2.08	1.93	1.83	1.74	1.65	1.58	1.51		
	2.4	2.13	2.01	1.83						1.68	1.51	1.41	1.34	1.26	1.19	1.12	1.06	
	3.6	1.86	1.64	1.47						1.33	1.21	1.12	1.03	0.96	0.90	0.84	0.80	
	4.8	1.58	1.37	1.22						1.09	0.99	0.90	0.83	0.77	0.71	0.67	0.63	
	2/240 x 45 1.2	2.88	2.78	2.70						2.62	2.46	2.32	2.20	2.12	2.05	1.98	1.92	
	2.4	2.69	2.58	2.49						2.35	2.19	2.04	1.92	1.81	1.71	1.62	1.54	
	3.6	2.54	2.35	2.12						1.94	1.78	1.65	1.53	1.43	1.34	1.26	1.20	
	4.8	2.28	2.01	1.80						1.62	1.48	1.36	1.26	1.17	1.09	1.02	0.96	
	2/290 x 45 1.2	3.35	3.24	3.14						3.06	2.82	2.62	2.45	2.36	2.28	2.20	2.12	
	2.4	3.15	3.03	2.93						2.84	2.62	2.42	2.26	2.15	2.05	1.96	1.88	
	3.6	2.99	2.87	2.76						2.67	2.45	2.25	2.10	2.00	1.91	1.82	1.74	
	4.8	2.85	2.73	2.62						2.45	2.25	2.05	1.90	1.81	1.71	1.62	1.54	
	6.0	2.74	2.61	2.37						2.14	1.95	1.79	1.66	1.54	1.44	1.35	1.27	
	7.5	2.61	2.30	2.04						1.83	1.66	1.52	1.40	1.30	1.21	1.13	1.06	
	10.0	2.18	1.88	1.65						1.46	1.32	1.20	1.10	1.01	0.94	0.88	0.82	
GANGLAM	2/330 x 45	1.2	3.98	3.85	3.74	3.64	3.55	3.48	3.40	3.34	3.28	3.22	3.17	3.12	3.07	3.02	2.97	2.92
	2.4	3.77	3.63	3.52	3.41	3.32	3.24	3.16	3.10	3.04	2.98	2.92	2.87	2.82	2.77	2.72	2.67	2.62
	3.6	3.60	3.45	3.33	3.23	3.13	2.97	2.79	2.63	2.48	2.35	2.24	2.14	2.04	1.94	1.84	1.74	1.64
	4.8	3.45	3.30	3.18	2.99	2.76	2.56	2.38	2.23	2.10	1.98	1.88	1.78	1.68	1.58	1.48	1.38	1.28
	6.0	3.32	3.17	2.91	2.64	2.42	2.23	2.07	1.93	1.80	1.70	1.60	1.50	1.40	1.30	1.20	1.10	1.00
	7.5	3.18	2.85	2.54	2.29	2.08	1.91	1.76	1.63	1.52	1.43	1.33	1.23	1.13	1.03	0.93	0.83	0.73
	10.0	2.71	2.35	2.07	1.85	1.67	1.52	1.40	1.29	1.19	1.09	1.00	0.90	0.80	0.70	0.60	0.50	0.40
	2/380 x 45	1.2	4.45	4.31	4.18	4.08	3.98	3.89	3.81	3.74	3.68	3.62	3.56	3.50	3.44	3.38	3.32	3.26
	2.4	4.24	4.08	3.95	3.84	3.74	3.65	3.57	3.49	3.42	3.36	3.30	3.24	3.18	3.12	3.06	3.00	2.94
	3.6	4.06	3.90	3.76	3.64	3.54	3.45	3.37	3.24	3.07	2.92	2.78	2.64	2.50	2.36	2.22	2.08	1.94
	4.8	3.90	3.73	3.60	3.48	3.37	3.18	2.98	2.80	2.64	2.49	2.36	2.22	2.08	1.94	1.80	1.66	1.52
	6.0	3.76	3.59	3.46	3.30	3.03	2.81	2.61	2.44	2.29	2.16	2.04	1.90	1.76	1.62	1.48	1.34	1.20
	7.5	3.61	3.44	3.19	2.89	2.64	2.43	2.25	2.09	1.96	1.84	1.73	1.62	1.51	1.40	1.29	1.18	1.07
	10.0	3.40	2.98	2.64	2.37	2.15	1.96	1.81	1.67	1.56	1.45	1.34	1.23	1.12	1.01	0.90	0.79	0.68
	2/430 x 45	1.2	4.90	4.75	4.62	4.50	4.39	4.30	4.21	4.13	4.06	3.99	3.93	3.87	3.81	3.75	3.69	3.63
	2.4	4.69	4.52	4.38	4.26	4.15	4.05	3.96	3.88	3.80	3.73	3.67	3.61	3.55	3.49	3.43	3.37	3.31
	3.6	4.50	4.33	4.18	4.05	3.94	3.84	3.75	3.66	3.57	3.48	3.39	3.30	3.21	3.12	3.03	2.94	2.85
	4.8	4.33	4.16	4.01	3.88	3.76	3.66	3.57	3.48	3.38	3.29	3.20	3.11	3.02	2.93	2.84	2.75	2.66
	6.0	4.19	4.01	3.86	3.73	3.61	3.41	3.18	2.98	2.81	2.65	2.51	2.37	2.23	2.09	1.95	1.81	1.67
	7.5	4.03	3.85	3.69	3.53	3.23	2.98	2.77	2.58	2.42	2.28	2.15	2.01	1.87	1.73	1.59	1.45	1.31
	10.0	3.80	3.62	3.26	2.93	2.67	2.44	2.25	2.09	1.95	1.83	1.71	1.59	1.47	1.35	1.23	1.11	0.99
	2/480 x 45	1.2	5.34	5.18	5.03	4.91	4.79	4.69	4.60	4.51	4.44	4.36	4.30	4.24	4.18	4.12	4.06	4.00
	2.4	5.12	4.95	4.79	4.68	4.54	4.43	4.34	4.25	4.17	4.09	4.03	3.97	3.91	3.85	3.79	3.73	3.67
	3.6	4.93	4.75	4.59	4.45	4.33	4.22	4.12	4.03	3.95	3.87	3.80	3.74	3.68	3.62	3.56	3.50	3.44
	4.8	4.76	4.57	4.41	4.27	4.14	4.03	3.94	3.85	3.75	3.66	3.57	3.48	3.39	3.30	3.21	3.12	3.03
	6.0	4.61	4.42	4.25	4.11	3.98	3.88	3.75	3.52	3.32	3.14	2.98	2.84	2.70	2.56	2.42	2.28	2.14
	7.5	4.44	4.24	4.08	3.94	3.81	3.54	3.29	3.08	2.89	2.72	2.58	2.44	2.30	2.16	2.02	1.88	1.74
	10.0	4.20	4.01	3.84	3.50	3.19	2.93	2.71	2.52	2.35	2.21	2.07	1.93	1.79	1.65	1.51	1.37	1.23
	2/530 x 45	1.2	5.77	5.60	5.44	5.31	5.19	5.08	4.98	4.88	4.80	4.72	4.65	4.58	4.51	4.44	4.37	4.30
	2.4	5.55	5.36	5.20	5.06	4.93	4.81	4.71	4.61	4.51	4.43	4.36	4.29	4.22	4.15	4.08	4.01	3.94
	3.6	5.35	5.16	4.99	4.84	4.71	4.59	4.48	4.39	4.30	4.22	4.15	4.08	4.01	3.94	3.87	3.80	3.73
	4.8	5.18	4.98	4.80	4.65	4.52	4.40	4.29	4.20	4.11	4.03	3.95	3.87	3.79	3.71	3.63	3.55	3.47
	6.0	5.02	4.81	4.64	4.48	4.35	4.23	4.13	4.03	3.95	3.87	3.79	3.71	3.63	3.55	3.47	3.39	3.31
	7.5	4.85	4.64	4.46	4.30	4.17	4.05	3.93	3.83	3.75	3.67	3.59	3.51	3.43	3.35	3.27	3.19	3.11
	10.0	4.60	4.38	4.21	4.05	3.73	3.43	3.18	2.96	2.77	2.60	2.45	2.30	2.15	2.00	1.85	1.70	1.55
	2/580 x 45	1.2	6.19	6.01	5.84	5.70	5.57	5.45	5.34	5.25	5.16	5.07	5.00	4.93	4.86	4.79	4.72	4.65
	2.4	5.97	5.77	5.59	5.44	5.31	5.18	5.07	4.97	4.88	4.79	4.72	4.65	4.58	4.51	4.44	4.37	4.30
	3.6	5.77	5.56	5.38	5.22	5.08	4.95	4.84	4.74	4.65	4.56	4.48	4.40	4.32	4.24	4.16	4.08	4.00
	4.8	5.59	5.37	5.19	5.03	4.88	4.76	4.64	4.54	4.45	4.36	4.28	4.20	4.12	4.04	3.96	3.88	3.80
	6.0	5.43	5.20	5.02	4.85	4.71	4.58	4.47	4.37	4.27	4.18	4.10	4.02	3.94	3.86	3.78	3.70	3.62
	7.5	5.24	5.02	4.83	4.67	4.52	4.40	4.28	4.18	4.09	4.00	3.92	3.84	3.76	3.68	3.60	3.52	3.44
	10.0	4.98	4.76	4.56	4.40	4.26	3.95	3.67	3.42	3.21	3.02	2.85	2.68	2.51	2.34	2.17	2.00	1.83

= regular duty plating

= heavy duty plating

= super heavy duty plating

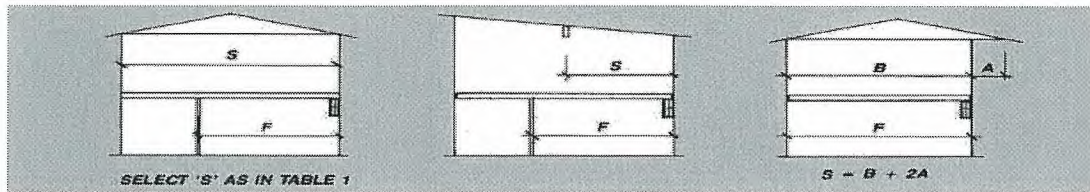


TABLE 8A:
LINTEL SUPPORTING LIGHT ROOF, WALL AND FLOOR JOISTS (2.4m MAX WALL HEIGHT)

	LINTEL SIZE	FLOOR SPAN 'F' (m)	MAXIMUM LINTEL SPAN (m)															
			SUPPORTED ROOF SPAN 'S' (m)															
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0					
SOLID TIMBER	2/90 x 45 2.5	0.95	0.93	0.92	0.90	0.88	0.87	0.86	0.84	0.83	0.82	0.81						
	4.0	0.93	0.91	0.89	0.88	0.86	0.85	0.84	0.83	0.81	0.80	0.79						
	5.5	0.89	0.88	0.87	0.86	0.85	0.83	0.82	0.81	0.80	0.79	0.78						
	7.0	0.82	0.81	0.80	0.79	0.79	0.78	0.77	0.76	0.76	0.75	0.74						
	2/115 x 45 2.5	1.43	1.40	1.36	1.34	1.31	1.28	1.25						1.24	1.22	1.20	1.18	
	4.0	1.33	1.31	1.29	1.27	1.26	1.24	1.22	1.21	1.19	1.17	1.16						
	5.5	1.19	1.18	1.16	1.15	1.14	1.13	1.11	1.10	1.09	1.08	1.07						
	7.0	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99						
	2/140 x 45 2.5	1.70	1.66	1.62	1.59	1.56	1.53	1.50						1.48	1.45	1.43	1.41	
	4.0	1.56	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.38	1.36						
	5.5	1.39	1.38	1.36	1.34	1.33	1.31	1.30	1.28	1.27	1.26	1.25						
	7.0	1.27	1.26	1.25	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16						
	2/190 x 45 2.5	2.31	2.25	2.20	2.16	2.11	2.07	2.04	2.00	1.97	1.94	1.91						
	4.0	2.11	2.08	2.05	2.02	1.99	1.96	1.94	1.91	1.89	1.87	1.84						
	5.5	1.89	1.87	1.84	1.82	1.80	1.78	1.76	1.74	1.73	1.71	1.69						
	7.0	1.73	1.71	1.69	1.67	1.66	1.64	1.63	1.61	1.60	1.58	1.57						
	2/240 x 45 2.5	2.92	2.85	2.78	2.72	2.67	2.62	2.57						2.53	2.49	2.45	2.42	
	4.0	2.67	2.63	2.59	2.55	2.52	2.48	2.45	2.42	2.39	2.36	2.33						
	5.5	2.39	2.36	2.33	2.30	2.28	2.25	2.23	2.20	2.18	2.16	2.14						
	7.0	2.18	2.16	2.14	2.12	2.09	2.07	2.06	2.04	2.02	2.00	1.98						
	2/290 x 45 2.5	3.39	3.33	3.28	3.23	3.18	3.13	3.09						3.05	3.01	2.96	2.92	
	4.0	3.22	3.17	3.13	3.08	3.04	3.00	2.96	2.92	2.88	2.85	2.81						
	5.5	2.88	2.85	2.82	2.78	2.75	2.72	2.69	2.66	2.63	2.61	2.58						
	7.0	2.63	2.61	2.58	2.56	2.53	2.51	2.48	2.46	2.44	2.42	2.40						
GANGLAM	2/330 x 45	2.5	3.99	3.92	3.85	3.79	3.74	3.68	3.63	3.59	3.55	3.50	3.47					
	4.0		3.90	3.83	3.77	3.72	3.67	3.62	3.57	3.53	3.49	3.45	3.42					
	5.5		3.50	3.46	3.42	3.38	3.34	3.30	3.27	3.23	3.20	3.17	3.14					
	7.0		3.20	3.17	3.14	3.11	3.08	3.05	3.02	2.99	2.96	2.94	2.91					
	2/380 x 45	2.5	4.44	4.36	4.28	4.22	4.15	4.09	4.04	3.99	3.94	3.90	3.85					
	4.0		4.33	4.26	4.19	4.13	4.08	4.02	3.97	3.93	3.88	3.84	3.80					
	5.5		4.03	3.99	3.94	3.89	3.85	3.81	3.76	3.72	3.68	3.65	3.61					
	7.0		3.68	3.65	3.61	3.58	3.54	3.51	3.48	3.44	3.41	3.38	3.35					
	2/430 x 45	2.5	4.87	4.78	4.70	4.63	4.56	4.49	4.43	4.38	4.32	4.27	4.23					
	4.0		4.75	4.67	4.60	4.53	4.47	4.41	4.36	4.31	4.26	4.21	4.17					
	5.5		4.57	4.51	4.46	4.40	4.35	4.31	4.26	4.21	4.17	4.13	4.09					
	7.0		4.17	4.13	4.09	4.05	4.01	3.97	3.93	3.90	3.86	3.83	3.80					
	2/480 x 45	2.5	5.29	5.19	5.10	5.02	4.95	4.88	4.81	4.75	4.70	4.64	4.59					
	4.0		5.16	5.08	5.00	4.92	4.86	4.79	4.73	4.68	4.63	4.57	4.53					
	5.5		5.05	4.97	4.90	4.84	4.77	4.71	4.66	4.61	4.56	4.51	4.47					
	7.0		4.65	4.61	4.56	4.52	4.47	4.43	4.39	4.35	4.31	4.27	4.24					
	2/530 x 45	2.5	5.70	5.59	5.50	5.41	5.33	5.26	5.19	5.12	5.06	5.00	4.95					
	4.0		5.56	5.47	5.38	5.30	5.23	5.16	5.10	5.04	4.98	4.93	4.88					
	5.5		5.44	5.36	5.28	5.21	5.14	5.08	5.02	4.96	4.91	4.86	4.81					
	7.0		5.14	5.09	5.04	4.99	4.94	4.89	4.85	4.80	4.76	4.72	4.68					
	2/580 x 45	2.5	6.09	5.98	5.88	5.79	5.70	5.62	5.55	5.48	5.41	5.35	5.29					
	4.0		5.95	5.85	5.76	5.68	5.60	5.52	5.46	5.39	5.33	5.27	5.22					
	5.5		5.82	5.73	5.65	5.57	5.50	5.43	5.37	5.31	5.25	5.20	5.15					
	7.0		5.62	5.57	5.51	5.46	5.40	5.35	5.29	5.24	5.18	5.13	5.08					

= regular duty plating

= heavy duty plating

= super heavy duty plating

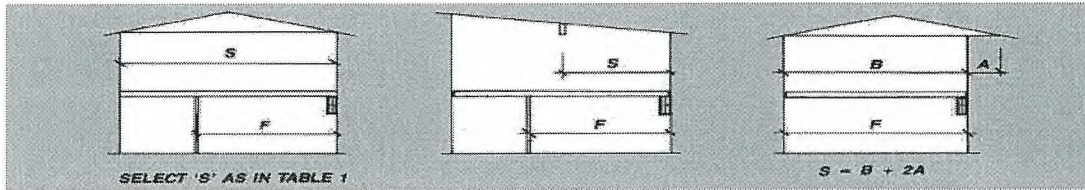


TABLE 8B:

LINTEL SUPPORTING HEAVY ROOF, WALL AND FLOOR JOISTS (2.4m MAX WALL HEIGHT)

	LINTEL SIZE	FLOOR SPAN 'F' (m)	MAXIMUM LINTEL SPAN (m)											
			SUPPORTED ROOF SPAN 'S' (m)											
			5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	
SOLID TIMBER	2/90 x 45	2.5	0.86	0.83	0.81	0.79	0.77	0.75	0.74	0.72	0.71	0.70	0.68	
		4.0	0.84	0.82	0.80	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.68	
		5.5	0.82	0.80	0.78	0.76	0.75	0.73	0.72	0.70	0.69	0.68	0.67	
		7.0	0.77	0.76	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	
	2/115 x 45	2.5	1.27	1.22	1.19	1.15	1.12	1.09	1.07	1.05	1.03	1.01	0.99	0.97
		4.0	1.23	1.20	1.16	1.13	1.10	1.08	1.05	1.03	1.01	0.99	0.97	
		5.5	1.12	1.09	1.07	1.05	1.03	1.02	1.00	0.98	0.97	0.95	0.94	
		7.0	1.03	1.01	1.00	0.98	0.96	0.95	0.94	0.92	0.91	0.90	0.89	
	2/140 x 45	2.5	1.51	1.46	1.42	1.38	1.35	1.31	1.28	1.26	1.22	1.19	1.16	1.13
		4.0	1.43	1.40	1.37	1.34	1.31	1.28	1.26	1.22	1.19	1.16	1.13	
		5.5	1.30	1.28	1.25	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.10	
		7.0	1.20	1.18	1.16	1.14	1.13	1.11	1.09	1.08	1.06	1.05	1.03	
	2/190 x 45	2.5	2.05	1.98	1.93	1.88	1.83	1.79	1.75	1.70	1.65	1.60	1.56	
		4.0	1.94	1.90	1.85	1.81	1.78	1.74	1.71	1.66	1.62	1.57	1.54	
		5.5	1.77	1.73	1.70	1.67	1.64	1.61	1.58	1.56	1.53	1.51	1.49	
		7.0	1.63	1.60	1.58	1.55	1.53	1.50	1.48	1.46	1.44	1.42	1.40	
	2/240 x 45	2.5	2.58	2.50	2.43	2.37	2.31	2.26	2.21	2.16	2.10	2.04	1.99	1.94
		4.0	2.46	2.40	2.34	2.29	2.24	2.20	2.16	2.12	2.07	2.01	1.96	1.91
		5.5	2.23	2.19	2.15	2.11	2.07	2.03	2.00	1.97	1.94	1.91	1.88	
		7.0	2.06	2.02	1.99	1.96	1.93	1.90	1.87	1.85	1.82	1.80	1.77	
	2/290 x 45	2.5	3.10	3.03	2.94	2.86	2.79	2.73	2.67	2.62	2.56	2.50	2.44	2.38
		4.0	2.97	2.90	2.83	2.77	2.71	2.66	2.60	2.54	2.47	2.40	2.34	2.27
		5.5	2.70	2.64	2.59	2.54	2.50	2.46	2.42	2.38	2.34	2.30	2.27	
		7.0	2.49	2.45	2.42	2.37	2.33	2.30	2.26	2.23	2.20	2.17	2.14	
GANGLAM	2/330 x 45	2.5	3.65	3.56	3.48	3.41	3.35	3.29	3.24	3.14	3.05	2.97	2.90	
		4.0	3.58	3.50	3.43	3.36	3.29	3.23	3.16	3.08	3.00	2.92	2.85	
		5.5	3.28	3.21	3.15	3.09	3.04	2.98	2.94	2.89	2.84	2.80	2.76	
		7.0	3.02	2.97	2.92	2.88	2.83	2.79	2.75	2.71	2.67	2.64	2.60	
	2/380 x 45	2.5	4.05	3.96	3.87	3.80	3.73	3.66	3.60	3.55	3.50	3.42	3.34	
		4.0	3.98	3.90	3.82	3.75	3.68	3.62	3.57	3.51	3.45	3.36	3.28	
		5.5	3.77	3.70	3.63	3.56	3.50	3.44	3.38	3.33	3.27	3.22	3.18	
		7.0	3.48	3.42	3.37	3.31	3.26	3.21	3.17	3.12	3.08	3.04	3.00	
	2/430 x 45	2.5	4.45	4.34	4.25	4.16	4.09	4.02	3.95	3.89	3.84	3.79	3.74	
		4.0	4.37	4.27	4.19	4.11	4.04	3.97	3.91	3.86	3.80	3.75	3.71	
		5.5	4.27	4.18	4.10	4.03	3.96	3.89	3.82	3.76	3.70	3.65	3.60	
		7.0	3.94	3.87	3.81	3.75	3.69	3.64	3.58	3.53	3.48	3.44	3.39	
	2/480 x 45	2.5	4.83	4.71	4.61	4.52	4.44	4.36	4.29	4.23	4.17	4.11	4.06	
		4.0	4.75	4.64	4.55	4.46	4.39	4.31	4.25	4.19	4.13	4.08	4.03	
		5.5	4.67	4.57	4.49	4.41	4.33	4.27	4.20	4.15	4.09	4.04	3.99	
		7.0	4.40	4.32	4.25	4.18	4.12	4.06	4.00	3.94	3.89	3.84	3.79	
	2/530 x 45	2.5	5.20	5.08	4.97	4.87	4.78	4.70	4.63	4.56	4.49	4.43	4.37	
		4.0	5.11	5.00	4.90	4.81	4.72	4.65	4.58	4.51	4.45	4.39	4.34	
		5.5	5.03	4.93	4.83	4.75	4.67	4.60	4.53	4.47	4.41	4.35	4.30	
		7.0	4.86	4.77	4.70	4.62	4.55	4.48	4.42	4.35	4.29	4.24	4.18	
	2/580 x 45	2.5	5.56	5.43	5.32	5.21	5.12	5.03	4.95	4.87	4.81	4.74	4.68	
		4.0	5.47	5.35	5.24	5.14	5.05	4.97	4.90	4.83	4.76	4.70	4.64	
		5.5	5.38	5.27	5.17	5.08	5.00	4.92	4.85	4.78	4.72	4.66	4.60	
		7.0	5.30	5.20	5.11	5.02	4.94	4.87	4.80	4.73	4.67	4.62	4.56	

= regular duty plating

= heavy duty plating

= super heavy duty plating

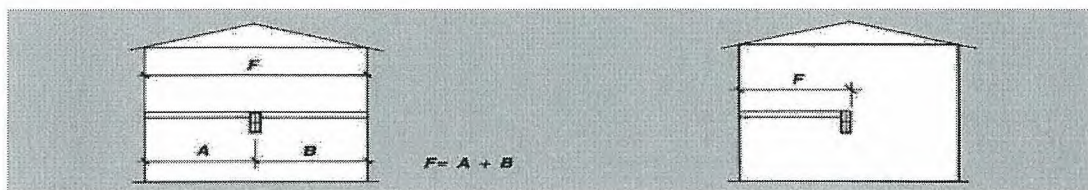


TABLE 9A:
1.5 kPa L.L. FLOOR BEAM SUPPORTING JOISTS

GANGLAM BEAM SIZE	MAXIMUM FLOOR BEAM SPAN (m)						
	JOIST SPAN 'F' (m)						
	2.4	3.6	4.8	6.0	7.2	8.4	
2/290 x 45*	3.98		3.98		3.73	3.34	3.04
2/330 x 45*	4.70		4.70		4.39	3.93	3.59
2/380 x 45*	5.41		5.41		5.06	4.53	4.13
2/430 x 45	6.12		6.07		5.65	5.12	4.68
2/480 x 45	6.83		6.59		6.13	5.72	5.22
2/530 x 45	7.54		7.10		6.61	6.25	5.76
2/580 x 45	8.25		7.60		7.07	6.69	
3/290 x 45*	4.62		4.62		4.57	4.16	3.80
3/330 x 45*	5.44		5.44		5.17	4.89	4.48
3/380 x 45	6.26		6.18		5.75	5.44	5.15
3/430 x 45	7.09		6.78		6.31	5.97	5.70
3/480 x 45	7.91		7.36		6.85	6.48	
3/530 x 45	8.74		7.93		7.38	6.98	
3/580 x 45	9.39		8.48		7.89		

*BEAM AT MAXIMUM SPAN FOR VIBRATION CONTROL

TABLE 9B:
2.5 kPa L.L. FLOOR BEAM SUPPORTING JOISTS

GANGLAM BEAM SIZE	MAXIMUM FLOOR BEAM SPAN (m)						
	JOIST SPAN 'F' (m)						
	2.4	3.6	4.8	6.0	7.2	8.4	
2/290 x 45	3.80		3.45		2.99	2.67	2.44
2/330 x 45	4.70		4.07		3.52	3.15	2.88
2/380 x 45	5.39		4.68		4.06	3.63	3.31
2/430 x 45	5.91		5.30		4.59	4.11	3.75
2/480 x 45	6.42		5.80		5.12		
2/530 x 45	6.92		6.25		5.66		
2/580 x 45	7.40		6.69				
3/290 x 45	4.62		4.31		3.73	3.34	3.04
3/330 x 45	5.41		4.89		4.39	3.93	3.59
3/380 x 45	6.02		5.44		5.06	4.53	
3/430 x 45	6.60		5.97		5.55		
3/480 x 45	7.17		6.48				
3/530 x 45	7.72		6.98				
3/580 x 45	8.28		7.47				

TABLE 9C:
3.0 kPa L.L. FLOOR BEAM SUPPORTING JOISTS

GANGLAM BEAM SIZE	MAXIMUM FLOOR BEAM SPAN (m)						
	JOIST SPAN 'F' (m)						
	2.4	3.6	4.8	6.0	7.2	8.4	
2/290 x 45	3.80		3.18		2.75	2.46	2.25
2/330 x 45	4.59		3.75		3.25	2.90	2.65
2/380 x 45	5.15		4.32		3.74	3.34	3.05
2/430 x 45	5.65		4.88		4.23	3.78	
2/480 x 45	6.13		5.45		4.72		
2/530 x 45	6.61		5.97				
2/580 x 45	7.07		6.39				
3/290 x 45	4.57		3.97		3.43	3.07	2.80
3/330 x 45	5.17		4.67		4.05	3.62	
3/380 x 45	5.75		5.20		4.66		
3/430 x 45	6.31		5.70				
3/480 x 45	6.85		6.19				
3/530 x 45	7.38						
3/580 x 45	7.89						

= regular duty plating

= heavy duty plating

= super heavy duty plating

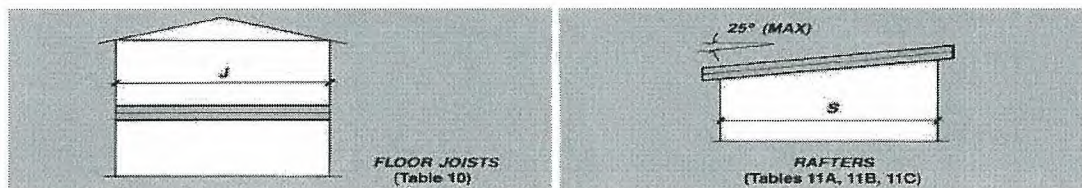


TABLE 10:
LONGSPAN GANGLAM FLOOR JOISTS

FLOOR L.L. (kPa)	JOIST CRS (mm)	MAXIMUM JOIST SPAN 'J' (m)							
		JOIST SIZE (x45mmWIDTH)							
		290	330	380	430	480	530	580	
1.5	400	4.90	5.54	6.16	6.75	7.34	7.90	8.45	
	450	4.75	5.38	5.98	6.56	7.12	7.67	8.21	
	600	4.42	5.00	5.56	6.10	6.63	7.14	7.64	
2.5	400	4.42	5.00	5.56	6.10	6.63	7.14	7.64	
	450	4.30	4.86	5.40	5.93	6.44	6.93	7.42	
	600	3.91	4.52	5.03	5.52	5.99	6.45	6.90	
3.0	400	4.29	4.85	5.39	5.92	6.42	6.92	7.40	
	450	4.16	4.71	5.24	5.74	6.24	6.72	7.19	
	600	3.61	4.25	4.87	5.35	5.80	6.25	6.69	

TABLE 11A
GANGLAM RAFTERS FOR LIGHT WEIGHT ROOF WITH NO CEILING (HIGH WIND)

SPACING (m)	MAXIMUM RAFTER SPAN 'S' (m)							
	RAFTER SIZE (x 45mmWIDTH)							
	290	330	380	430	480	530	580	
0.9	6.26	7.08	7.87	8.54	9.07	9.57	10.06	
1.2	5.69	6.35	6.93	7.43	7.89	8.32	8.74	
1.8	4.73	5.26	5.72	6.13	6.50	6.85	7.19	
2.4	4.16	4.61	5.01	5.36	5.68	5.98	6.27	
3.0	3.78	4.18	4.53	4.84	5.12	5.39	5.65	
3.6	3.51	3.86	4.18	4.46	4.72	4.96	5.19	
4.2	3.30	3.62	3.91	4.17	4.40	4.62	4.84	
4.8	3.13	3.43	3.70	3.94	4.15	4.36	4.56	

NOTE: FOR WIND UPLIFT, BOTTOM EDGE RESTRAINTS ARE REQUIRED AT 1.2m CRS OVER MIDDLE HALF OF RAFTER SPAN.
RESTRAINTS ARE NOT REQUIRED IF PURLINS HALF THE RAFTER DEPTH OR MORE ARE FIXED INTO THE SIDE OF THE RAFTERS

TABLE 11B
GANGLAM RAFTERS FOR LIGHT WEIGHT ROOF WITH CEILING

SPACING (m)	MAXIMUM RAFTER SPAN 'S' (m)							
	RAFTER SIZE (x 45mm WIDTH)							
	290	330	380	430	480	530	580	
0.9	5.40	6.11	6.79	7.45	8.09	8.69	9.13	
1.2	5.03	5.69	6.30	6.76	7.18	7.56	7.94	
1.8	4.33	4.80	5.22	5.59	5.92	6.23	6.54	
2.4	3.82	4.23	4.58	4.90	5.18	5.45	5.72	
3.0	3.48	3.84	4.15	4.43	4.68	4.92	5.16	
3.6	3.24	3.56	3.84	4.09	4.32	4.53	4.75	
4.2	3.05	3.34	3.60	3.83	4.04	4.24	4.43	
4.8	2.90	3.17	3.41	3.62	3.82	4.00	4.18	

TABLE 11C
GANGLAM RAFTERS FOR HEAVY WEIGHT ROOF WITH CEILING

SPACING (m)	MAXIMUM RAFTER SPAN 'S' (m)							
	RAFTER SIZE (x 45mm WIDTH)							
	290	330	380	430	480	530	580	
0.9	4.57	5.21	5.79	6.36	6.90	7.33	7.70	
1.2	4.11	4.74	5.30	5.73	6.07	6.40	6.71	
1.8	3.51	4.03	4.45	4.76	5.03	5.29	5.55	
2.4	3.12	3.57	3.93	4.19	4.42	4.64	4.86	
3.0	2.84	3.25	3.58	3.81	4.01	4.21	4.40	
3.6	2.63	3.00	3.32	3.53	3.71	3.89	4.06	
4.2	2.46	2.81	3.11	3.32	3.49	3.65	3.81	
4.8	2.32	2.64	2.93	3.15	3.30	3.45	3.60	

= regular duty plating

= heavy duty plating

= super heavy duty plating

Fixing Specifications

By comparing the shaded colour in the selection charts with the Fixing Index Table below, you are able to select the duty of the beam (Refer GANGLAM Plate Maximum Spacing Table on Page 21) e.g. 2/330 x 45 Regular Duty. Within that duty select the correct wind area as per NZS 3604 or NZS 4203 e.g. High Wind. Go to the GANGLAM depth selected e.g. 330 and find out your fixing index, e.g. 'B'.

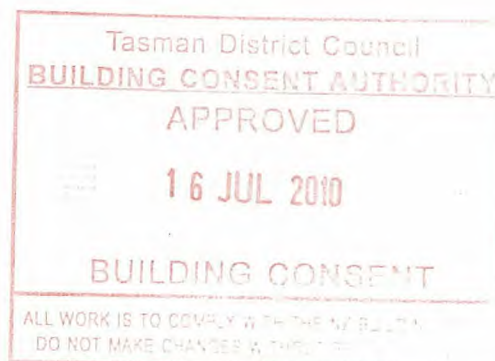
You then look to the GANGLAM Site Connections on Page 19 for the fixing required for both the beam end and its support base e.g. beam end 4T10 on top, 4T10 and Strap Nail both sides - support base, 3/4T10's & 2 Bottom Plate Anchor Fixings.

Please read the following notes carefully before selecting fixings.

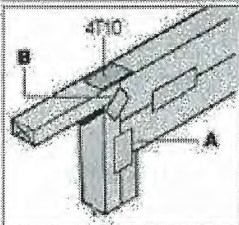
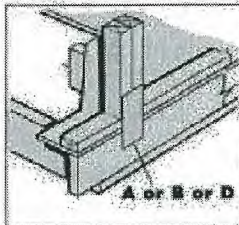
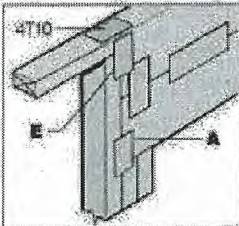
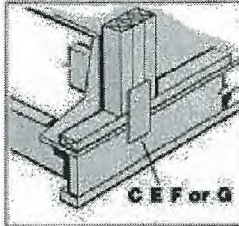
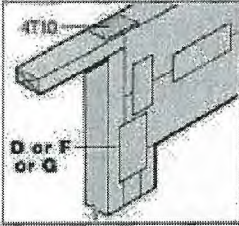
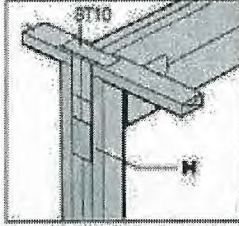
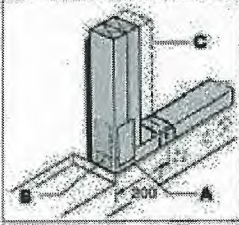
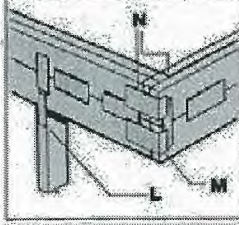
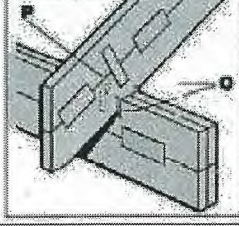
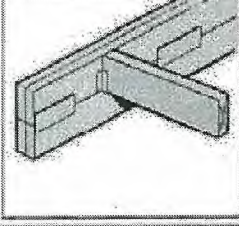
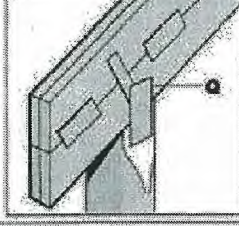
1. These fixings have been capacity designed. Other fixings may be designed for use in lieu of these details.
2. All fixings should be LUMBERLOK unless otherwise specified.
3. All Nailon, Multigrip, Strapfixing, Joist Hangers etc to be fully nailed using 30mm x 3.15 dia. LUMBERLOK Product Nails.
4. All splices in beams are factory made.
5. Site penetrations of 50mm dia. maximum may be made along the beam centreline only. Holes must be clear of all connectors and be at least 1200mm apart.
6. Site fixings are to be placed with equal area on beam and support or support and base.

GANGLAM FIXING INDEX								
GANGLAM DUTY WIND		GANGLAM DEPTH (mm)						
		290	330	380	430	480	530	580
REGULAR L	M	A	A	A	A	A	A	A
	H	A	A	A	A	A	A	A
	VH	B	B	E	E	E	E	E
		B	B	F	F	F	F	F
HEAVY L	M	A	A	A	A	A	A	A
	H	B	B	C	C	C	C	C
	VH	D	D	F	F	F	F	F
		D	D	F	F	F	F	F
SUPER L	M	A	A	A	A	A	A	A
	H	B	D	E	E	E	E	E
	VH	D	G	G	G	G	G	G
		D	G	G	G	G	G	G
UNDERSTUDS SINGLE		SINGLE*	DOUBLE	DOUBLE	DOUBLE	DOUBLE	DOUBLE	DOUBLE

*NOTE: ALL 'G' FIXINGS REQUIRE DOUBLE UNDERSTUDS.

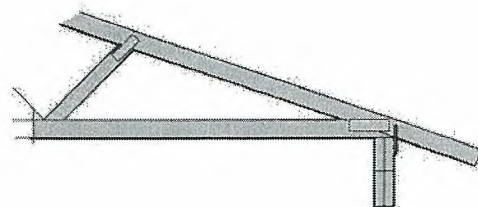


Site Connections

	BEAM END — TYLOK A 4T10 both sides B As A plus Strap Nail both sides		SUPPORT BASE — TWO STUDS ONTO TIMBER A 8T10 one side only B 10T15 one side only D 200 x 110 x 1mm Nail on one side only
	BEAM END — DOUBLE TYLOK E As A plus 4T10 both sides		SUPPORT BASE — 3 STUDS ONTO TIMBER C 10T15 one side only E 200 x 110 x 1mm Nail on one side only F 280 x 110 x 1mm Nail on one side only G 360 x 110 x 1mm Nail on one side only
	BEAM END — NAILON D or C 200 x 110 x 1mm Nail outside plus 4T10 inside F 200 x 110 x 1mm Nail both sides G 280 x 110 x 1mm Nail both sides		BEAM POCKET H 8T15 TYLOK plate (typical)
	SUPPORT BASE — TYLOK ONTO CONCRETE A 4T10 both sides 1 BOTTOM PLATE FIXING ANCHOR B as A plus 4T10 to end stud plus BOTTOM PLATE ANCHOR C as B but with double understud to beam		CANTILEVERED BEAM & SUSPENDED LINTEL L 200mm Strapfixing both sides at each support (All cases) M 1/200 x 50 x 110 x 1mm Nailon cleat & Multi-grip inside (typical) N 2 x M on Heavy roof over 200 x 100 suspended Lintel size (typical)
	JOIST OR PURLIN TO GANGLAM Joist or Purlin fixings may be selected by referring to the Maxspan brochure		RAFTER TO BEAM O 2 wire dogs with blocking for A to D index P CT200 with 4 nails each end both sides for E to G (birds-mouth rafter only)
	POLE TO GANGLAM Q 200 x 110 x 1mm Nailon both sides onto pole cut for bearing and face cut for Nailon		

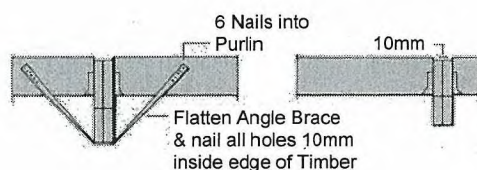
Top Edge Restraint

All GANGLAM lintels and rafters are to be restrained along their top edge at 900mm centres maximum for heavy roof and 1200mm centres maximum for light roof. Floor beams or joists are restrained along their top edge at 600mm centres maximum for beams up to 380mm deep and 450mm centres maximum for beams up to 580mm deep.



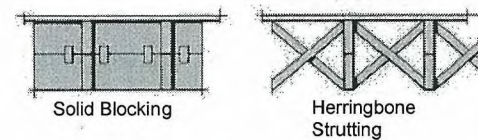
Bottom Edge Restraint

GANGLAM rafters subject to wind uplift are to be restrained along their bottom edge at 1.2m centres over middle half of rafter span. Bottom edge restraints are not required where purlins half the depth or more are fixed onto the side of the rafter.



Joists

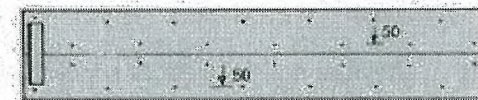
GANGLAM joists - to use solid blocking or herringbone strutting as per NZS 3604.



Architectural GANGLAM

Architectural GANGLAM Beams have no splices and all shear plates are in between layers with no stitch plates on the outside.

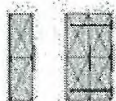
3mm Packer



90mm long x 3.15mm dia. jolt head nails at 150mm staggered centres punched and puttied one side only

Multilayered Beams

Multilayered beams should be nailed together with 90mm x 3.15 dia. nails at 150mm centres along the top and bottom edges. Bolting together may be required if four or more layers are used.



Stitch plate (GNQ-5x10) one side



(GNQ-8x18) support plate both sides

GANGLAM Plate

The GNQ-10x25 plate is pressed on only one side of each 45mm layer for regular and heavy duty GANGLAM, and both sides for super duty GANGLAM. The plate spacing is not to exceed the maximum for that grade.

GANGLAM Plate Maximum Spacing

Regular Duty GANGLAM Plate Spacing : 600mm one side only
Heavy Duty GANGLAM Plate Spacing : 300mm one side only
*Super Heavy Duty GANGLAM Plate Spacing : 300mm both sides, no stitch plate required

* Architectural GANGLAMS are only regular or heavy duty.

Plate Specification

GANGLAM connector plates are G300 steel, Z275 galvanised, 1.0 and 1.6mm thickness. Grade 316 stainless steel is also available.

Support Plate

These are pressed on both sides of each 45mm layer directly above every support location.

Stitch Plate

These are pressed on the opposite side of the GANGLAM plates, spaced at not more than 2.0m apart.

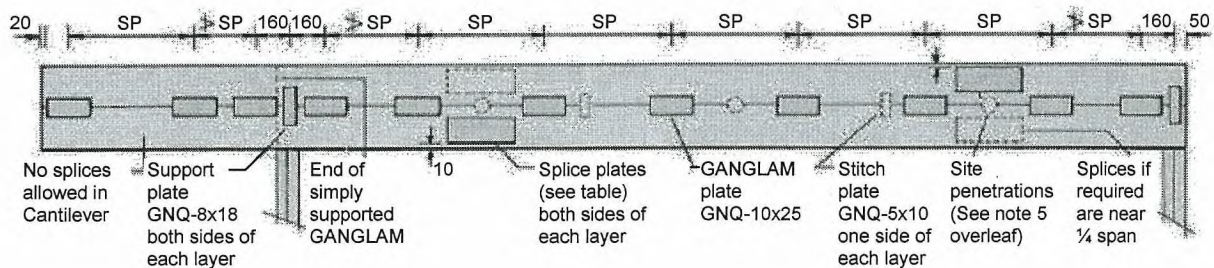
They are not required for super duty GANGLAM or architectural GANGLAM.

Splice Plate

Splice Plate Size

Timber components may be butt-jointed to required length with splice plates on both sides of each 45mm layer. Splice plates should be located around quarter spans.

GANGLAM Depth (mm)	290, 330 380, 430 480, 530, 580
Splice Plate Size (GN16)	9x43 14x33 14x43



GIB® Wall Bracing Calculation Sheet A

single storey

V85A

GIB® EzyBrace™

GIB® Bracing Systems, 2006

Job Details

Name	Type 1a	note
Street and Number	100 Job Road	cells D4 and D8 appear as LH and RH
Lot and DP Number	Lot 10 DP 100	headers on all printed sheets
City/Town/District	Jobtown	
Designer and date	A.R. Chitect	1-Jan-00
Company Name	RJ Ker Contractors Ltd	

Building Specification

Location of Storey	single	▼	
Floor Loading	2 kPa	▼	
Foundation Type	slab	▼	
Building Height to Apex (m)	6	▼	
Roof Height above Eaves (m)	3	▼	
Stud Height (m)	2.4	▼	
Cladding Weight (top or single)	heavy	▼	
Cladding Weight (lower)	light	▼	not applicable (single storey building)
Cladding Weight (subfloor)	light	▼	not applicable (slab)
Roof Weight	light	▼	
Roof Pitch (degrees)	25-45	▼	
Room in Roof Space	no	▼	
Building Length (m)	11.4	▼	Use roof length including eaves
Building Width (m)	9.3	▼	Use roof length including eaves
Gross Building Plan Area (m2)	103.7	▼	

Building Location

Wind Zone	High		Earthquake Zone	
Region	R2	▼	A	▼
Terrain	Inland	▼		
Exposure	Exposed	▼		
Topography	Gentle	▼		

Enter at least 'moderate' in a Lee Zone

Bracing Units required for Wind

per m	subfloor	walls
W along	n/a	78 BUs/m
W across	n/a	78 BUs/m
Totals	subfloor	walls
W along	n/a	725 BUs
W across	n/a	889 BUs

Bracing Units required for Earthquake

per m2	subfloor	walls
E	n/a	5.6 BUs/m2
Totals	subfloor	walls
E along	n/a	581 BUs
E across	n/a	581 BUs

GIB® Wall Bracing Calculation Sheet B

single storey

V85A

GIB® EzyBrace™

GIB® Bracing Systems, 2006

Across									
Wall or Bracing Line		Bracing Elements provided						Wind	Earthq.
1	2	3	4	5	7	8	6	9W	10EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Supplier	Bracing Type	Element Length L (m)	Element Height H (m)	Angle to Bracing line (degrees)	BUs Achieved	BUs Achieved
M	enter	1	GIB®	GS1a	2.4	2.4		180	156
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	360	4							
EQ	312	5							
N	enter	1	GIB®	GS1a	1.8	2.4		117	99
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	297	4							
EQ	255	5							
O	enter	1	GIB®	GS1a	2.4	2.4		180	156
		2							
line totals		3							
W	180	4							
EQ	156	5							
P	enter	1	ply	Sp2	0.9	2.4		81	72
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	261	4							
EQ	228	5							
Q	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
R	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
S	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
T	enter	1							
		2							
line totals		3							
W		4							
EQ		5							

								Wind	Earthq.
Totals Achieved								1098	951
								OK	OK
Totals Required (from Sheet A)								889	581

Tasman District Council
BUILDING CONSENT AUTHORITY
 APPROVED
 16 JUL 2010
BUILDING CONSENT
 ALL WORK IS TO COMPLY WITH THE NZ BUILDING CODE
 DO NOT MAKE CHANGES WITHOUT PRIOR APPROVAL

GIB® Wall Bracing Calculation Sheet A

single storey

V85A

GIB® EzyBrace™

GIB® Bracing Systems, 2006

Job Details

Name	Type 1b	note
Street and Number	100 Job Road	cells D4 and D8 appear as LH and RH
Lot and DP Number	Lot 10 DP 100	headers on all printed sheets
City/Town/District	Jobtown	
Designer and date	A.R. Chitect	1-Jan-00
Company Name	R J Ker Contractors Ltd	

Building Specification

Location of Storey	single	▼	
Floor Loading	2 kPa	▼	
Foundation Type	slab	▼	
Building Height to Apex (m)	6	▼	
Roof Height above Eaves (m)	3	▼	
Stud Height (m)	2.4	▼	
Cladding Weight (top or single)	heavy	▼	
Cladding Weight (lower)	light	▼	not applicable (single storey building)
Cladding Weight (subfloor)	light	▼	not applicable (slab)
Roof Weight	light	▼	
Roof Pitch (degrees)	25-45	▼	
Room in Roof Space	no	▼	
Building Length (m)	11.4		Use roof length including eaves
Building Width (m)	9.3		Use roof length including eaves
Gross Building Plan Area (m2)	103.7		

Building Location

Wind Zone	High		Earthquake Zone	
Region	R2	▼	A	▼
Terrain	Inland	▼		
Exposure	Exposed	▼		
Topography	Gentle	▼		

Enter at least 'moderate' in a Lee Zone

Bracing Units required for Wind

per m	subfloor	walls
W along	n/a	78 BUs/m
W across	n/a	78 BUs/m
Totals	subfloor	walls
W along	n/a	725 BUs
W across	n/a	889 BUs

Bracing Units required for Earthquake

per m2	subfloor	walls
E	n/a	5.6 BUs/m2
Totals	subfloor	walls
E along	n/a	581 BUs
E across	n/a	581 BUs

V85A

GIB® Bracing Systems, 2006

Across		GIB Bracing Systems, 2006							
Wall or Bracing Line		Bracing Elements provided					Wind	Earthq.	
1	2	3	4	5	7	8	6	9W	10EQ
Line Label	Minimum BUs Req/Ach	Bracing Element No.	Supplier	Bracing Type	Element Length L (m)	Element Height H (m)	Angle to Bracing line (degrees)	BUs Achieved	BUs Achieved
M	enter	1	GIB®	GS1a	2.4	2.4		180	156
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	360	4							
EQ	312	5							
N	enter	1	GIB®	GS1a	1.8	2.4		117	99
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	297	4							
EQ	255	5							
O	enter	1	GIB®	GS1a	2.4	2.4		180	156
		2							
line totals		3							
W	180	4							
EQ	156	5							
P	enter	1	ply	Sp2	0.9	2.4		81	72
		2	GIB®	GS1a	2.4	2.4		180	156
line totals		3							
W	261	4							
EQ	228	5							
Q	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
R	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
S	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
T	enter	1							
		2							
line totals		3							
W		4							
EQ		5							
							Wind	Earthq.	
Totals Achieved							1098	951	
							OK	OK	
Totals Required (from Sheet A)							889	581	

GIB® Bracing Systems, 2006

*For full construction details see literature
GIB® Bracing Systems, 2006*

Supplier	System	Minimum Length (m)	BU's W/m	BU's EQ/m
	none			
GIB®	GS1a	1.8	65	55
		2.4	75	65
GIB®	GS2	1.2	70	60
		1.8	80	70
		2.4	90	80
GIB®	BL1	0.4	120	115
		0.6	125	115
GIB®	BL1a	1.8	130	115
GIB®	BLP	0.6	145	135
		0.9	145	145
GIB®	BLG	0.6	145	130
		1.2	150	130
Ply	SP1	0.9	100	100
Ply	Sp2	0.6	90	80
Ply	Sp4	0.45	70	85
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			
Custom	Custom			

©Winstone Wallboards Limited, 1999-2006.
All rights reserved

BOTTOM PLATE FIXING

Bottom plate fixing for GIB® Bracing Elements

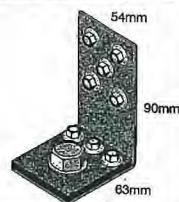
Brace type	Concrete slabs		Timber Floors
	External wall	Internal walls	External and Internal walls
GS1 (10 and 13)	As per NZS 3604:1999. No specific additional fastening required	As per NZS 3604:1999. Alternatively use 75 x 3.8mm shot fired fasteners with 16mm washers, 150mm and 300mm from each end of the element and 600mm thereafter.	Pairs of hand driven 100x3.75mm FH nails or 3 power driven 90x3.15 nails at 600mm centres maximum in accordance with NZS 3604:1999.
GS2 (10 and 13)	Not applicable		
BL1 (10 and 13) BLP	Intermediate fastenings to comply with NZS 3604:1999 In addition: GIB HandiBrac® and a concrete anchor with a minimum characteristic uplift capacity of 15kN at each end of the bracing element, or metal wrap-around strap and a concrete anchor with a minimum characteristic uplift capacity of 15kN fitted with a 50x50x3mm square washer within 100mm of each end of the bracing element		Pairs of hand driven 100x3.75mm FH nails or 3 power driven 90x3.15 nails at 600mm centres maximum in accordance with NZS 3604:1999. In addition: GIB HandiBrac® and a 12x150mm galvanised coach screw at each end of the bracing element, or metal wrap-around strap and a 12x150mm galvanised coach screw fitted with a 50x50x3mm square washer within 100mm of each end of the bracing element, or double metal strap to boundary joist (external walls only)
BLG	Not applicable	As for BL1 and BLP on concrete slabs above	

PANEL HOLD-DOWN DETAILS

GIB HandiBrac® - RECOMMENDED METHOD

Developed in conjunction with MiTek™ NZ, the GIB HandiBrac® has been designed and tested for use as a hold-down in GIB® BL and UP 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 into the framing as recommended with conventional straps
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings



Concrete Floor		Timber Floor	
External walls	Internal walls	External walls	Internal walls
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate	Position GIB HandiBrac® at the stud / plate junction	Position GIB HandiBrac® in the centre of the perimeter joist or bearer	Position GIB HandiBrac® in the centre of floor joist or full depth solid block
Hold-down fastener requirements			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN.		12x150mm galvanised coach screw	

Bracing strap installation

Care needs to be taken with the installation of the bracing strap. It should be checked in to be flush with the face of the stud providing a flat substrate for the plasterboard. It should be positioned in such a way that the important corner fastenings of the bracing element are not affected by it. Keeping the strap to the edge of the end stud as shown will allow the important corner fastenings to be installed without having to penetrate the bracing strap.

Concrete Floor	Timber Floor
400 x 25 x 0.9mm galvanised strap to pass under the plate and up the other side of the stud. Six 30x2.5 flat head galvanised nails to each side of the stud. Three 30x2.5 flat head galvanised nails to each side of the plate. Hold down bolt to be fitted within 100mm of the edge of the element.	
Internal wall	External wall
2/300 x 25 x 0.9mm galvanised straps with six 30 x 2.5mm flat head galvanised nails to each stud and into the floor joist and three nails to the plate. Block to nog fixed with 3/100 x 3.75mm nails to stud.	
Hold-down fastener requirements	
Concrete floor	Timber floor
A mechanical fastening with a minimum characteristic uplift capacity of 15kN fitted with a 50x50x3mm square washer within 100 mm of the ends of the bracing element.	12x150mm galvanised coach screw fitted with a 50x50x3mm square washer within 100mm of the ends of the bracing element

**BRACING ELEMENT
HOLD-DOWN DETAILS.**

Project Details

H1 Report created by:

Project Name: ker type1

Client: RJ KER

Lot No:

Comment: Nelson Type1

Project Id: 6441

Report Date: 29/04/2010

Compliance Result

This building complies with H1 via the following methods:

- the Calculation Method in NZS4218:2004 (Sept 2008 R-values)

NZS4218:2004 Calculation Method Compliance

The use of the Calculation Method is permitted.

In order to comply the Actual Heat Loss must be the same or smaller than the Reference Heat Loss AND all component R-values must be the same or larger than 60% of the R-values in the '60% Rule' table below. This design complies with the NZS4218:2004 Calculation Method.

<u>Heat Loss:</u>	<u>Reference building</u>	<u>Actual building</u>
	<u>227</u>	<u>213</u>

<u>Minimum R-values ("60% rule"):</u>	<u>Permitted minimum</u>	<u>Actual minimum</u>
Floor R-value	<u>0.8</u>	<u>1.31</u>
Wall R-value	<u>1.2</u>	<u>1.84</u>
Roof R-value	<u>2</u>	<u>2.56</u>
Glazing R-value	<u>0.15</u>	<u>0.26</u>
Skylight R-value	<u>0.2</u>	<u>0.34</u>

The Reference building has the following areas and R-values

	<u>Area</u>	<u>R-value</u>
Floor	<u>84.4</u>	<u>1.3</u>
Wall	<u>63.5</u>	<u>2</u>
Roof	<u>85.5</u>	<u>3.3</u>
Glazing (30% of Total Wall)	<u>27.2</u>	<u>0.26</u>
Glazing (surplus of 30%)	<u>0</u>	<u>0.34</u>
Skylight	<u>0</u>	<u>0.34</u>

Design Details

Building Dimensions

Floor Area	<u>84.4</u>
Gross Wall Area	<u>90.7</u>
Net Wall Area	<u>70.3</u>

	ID	Orientation	Width	Height	Gross Area	Net Area	R-value	Heat Loss	Shading Coeff.
<u>Floors</u>									
Floor 1	slab				84.4	84.4	1.31	64.4	
<u>Walls</u>									
Wall 1	1	North	7.8	2.4	18.7	7.9	1.95	4.1	
Window 1-1	w2		2.2	2.0		4.4	0.26	16.9	0.35
Window 1-2	w9		3.2	2.0		6.4	0.26	24.6	0.35
Wall 2	1	East	8.89	2.4	21.3	17.1	1.84	9.3	
Window 2-1	w3		1.8	1.0		1.8	0.26	6.9	0.35
Window 2-2	w4		2.0	1.2		2.4	0.26	9.2	0.35
Wall 3	2	East	.4	2.4	1	1	1.95	0.5	
Wall 4	1	South	11.4	2.4	27.4	22	1.84	11.9	
Window 4-1	w5		2.0	0.6		1.2	0.26	4.6	0.35
Window 4-2	w6		0.6	1.0		0.6	0.26	2.3	0.35
Window 4-3	w7		1.2	1.0		1.2	0.26	4.6	0.35
Window 4-4	w8		2.0	1.2		2.4	0.26	9.2	0.35
Wall 5	1	West	9.3	2.4	22.3	22.3	1.94	11.5	
<u>Roofs</u>									
Roof 1	1		85.5	1	85.5	85.5	2.56	33.4	
<u>Total Heat Loss</u>								213.4	

Compliance with Clause E3

This building complies with the R-value targets in NZBC Clause E3.

<i>Component</i>	<i>Minimum R-value</i>	<i>Project R-value</i>
Framed wall constructions with cavities	1.5	<u>1.88</u>
Single skin masonry wall without a cavity	0.6	<u> </u>
Solid timber wall no less than 60 mm thick	0.6	<u> </u>
Roof or ceilings	1.5	<u>2.56</u>

Floor Construction Details

1 Timber frame with vented cavity

external surface 0.03

Cladding Linea weatherboard

R-value: 0.04

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Timber Frame & Cavity 90mm, studs @ 400mm, dwangs @ 800mm

Frame Area: 20%

Cavity Area: 80%

Timber Frame

Insulation 2.6

R-value: 0.75

still Airgap

20-90mm airgap (non-reflective)

R-value: 0.16

Wall Lining Gypsum plasterboard 10mm

R-value: 0.04

internal surface 0.09

2.04 m²K/W.**2 Timber frame with vented cavity**

external surface 0.03

Cladding 70mm brick

R-value: 0.06

15-90mm vented cavity (all R-values on ext. side of cavity will be halved), R: 0.08

Timber Frame & Cavity 90mm, studs @ 400mm, dwangs @ 800mm

Frame Area: 20%

Cavity Area: 80%

Timber Frame

Insulation 2.6

R-value: 0.75

still Airgap

20-90mm airgap (non-reflective)

R-value: 0.16

Wall Lining Gypsum plasterboard 10mm

R-value: 0.04

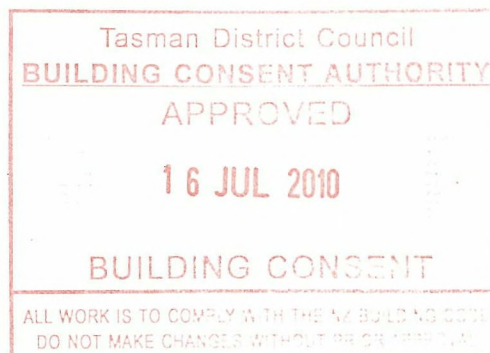
internal surface 0.09

2.05 m²K/W.

external surface 0.03	
Roofing	Metal tiles with building paper
R-value: 0.01	
Roof space (still air) 0.11	
Insulation 1.1	
Timber Frame & Cavity	94mm rafters or joists @ 900mm, dwangs @ 900mm
Frame Area: 10%	Cavity Area: 90%
Trusses and dwangs	Insulation 3.6
R-value: 0.78	
Ceiling Lining	Gypsum plasterboard 10mm
R-value: 0.04	
internal surface 0.09	
2.92 m²K/W.	

This report was created with the Design-Navigator (www.design-navigator.co.nz).

Print Report Close Report



Job: FE2865A

Client: A Customer
Phone:Site: TYPE 1
NELSONDescription: VILLA 1a
Building Consent No.:
MiTek 20/20 Engineering 4.5.147

MiTek New Zealand Ltd.

Phone:

Printed: 15:26:58 16 Mar 2010

PRODUCER STATEMENT for MiTek 20/20™ TRUSS DESIGN

The MiTek 20/20™ truss design program has been developed by MiTek New Zealand Ltd for the design of GANG-NAIL® 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 Building Code.

This producer statement covers the MiTek 20/20™ truss design and the structural performance of the GANG-NAIL plate.

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

- All proprietary products meeting their performance specification requirements
- The provision of adequate roof bracing and overall building stability
- Correct selection and placement of fixings
- Correct input of Truss Design Data below
- The design being undertaken by suitably trained personnel
- The truss design being carried out in accordance with MiTek 20/20 User Terms and Conditions,

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 Building Code.

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

On behalf of MiTek New Zealand Ltd,

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

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 GANG-NAIL Fabricator shall ensure that these job details are current and relevant to the project for the design of the trusses.

Job Details**Roof Truss**

Timber Group: MSG45H1H3
Roof
Material: Metal Tiles
Dead Load: 0.210 kPa
Restraints: 400 mm centres
Live Load: Q_{ur} = 0.250 kPa
Q_c = 1.100 kN

Importance Level : 2

Pitch: 15.000 deg
Ceiling
Material: Standard
Dead Load: 0.200 kPa
Restraints: 400 mm centres
Live Load: Q_c = 1.400 kN

Occupancy Live Load

Distributed: Q_{uf} = 1.500 kPa
Concentrated: Q_{cf} = 1.800 kN

Design Working Life : 50 years

Std Overhang: 590 mm
Wind
Area: Medium (37.0 m/s)
PressureCoeff: C_{pe} = varies; C_{pi} = -0.30, 0.20

Snow

Location: Nelson (N3 at 220 m)
Open Ground Load: 0.300 kPa
Basic Roof Load: 0.400 kPa

Attic Floor

Material: 20mm Particle Board
Dead Load: 0.200 kPa
Restraints: Continuous

Attic Room Ceiling

Material: Gib Board 12mm
Dead Load: 0.200 kPa
Restraints: 600 mm centres

Attic Wall

Material: Gib Board
Dead Load: 0.300 kPa
Restraints: Continuous

The timber for these trusses shall be standard gauged and treated to the requirements of NZS 3602:2003. Unless otherwise noted, this design assumes that the steel fixings and timber connectors proposed are located in a "closed environment", as defined by NZS3604:1999 Section 4.

Truss List

Legend: * = detail only, ? = input only, Txx = failed design, Ø = non certified, Unmarked trusses = designed successfully, LB = lateral bracing 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)
GT01	1	8800	15.000	900 LB	T02A	2	7000	44.994	865	*R01	1	1503	15.000	900
GT02	1	8800	15.000	900 LB	T02B	4	7000	44.994	865	*R01A	1	1503	15.000	900
T01	6	8800	15.000	865 LB	T02C	2	7000	44.994	865	*R01B	1	1503	15.000	900
T01A	1	8800	15.000	865 LB	*HB01	4	3380	10.729	900	*R01C	1	1503	15.000	900
T01B	2	8800	15.000	865 LB	J01	10	1800	15.000	900	*R02	3	903	15.000	900
T01C	1	8800	15.000	865 LB	J01A	2	1800	15.000	900	*R02A	3	903	15.000	900
T01D	1	8800	15.000	865 LB	J01B	2	1800	15.000	900	*R02B	1	903	15.000	900
T01E	1	8800	15.000	865 LB	J01C	4	1800	15.000	900	*R02C	1	903	15.000	900
T02	2	7000	44.994	865 LB	J02	10	1710	15.000	865					

Total quantity : 68

The computer design input has been carried out by:

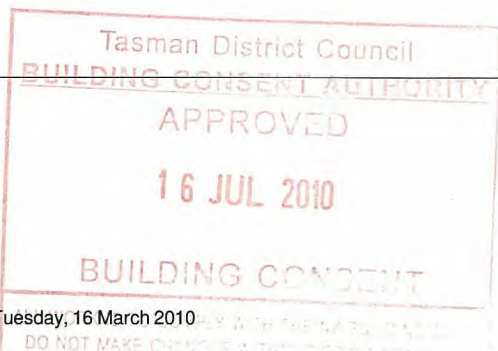
Name of Computer Operator: Jenny Corbett

Qualifications and Title: Truss Detailer

Signed:

CARTERS
A Division of Carter Holt Harvey

Dated: Tuesday, 16 March 2010



AMENDED



AMENDED

ARDEX WPM 001

Superflex Bathroom & Balcony Premixed - 1 Part

Single Component Undertile Waterproofing Membrane

BRANZ Appraised

Low VOC content – meets Green Building Council of
Australia Green Star IEQ-13 requirements

Fast drying one part acrylic membrane

Tasman District Council	
BUILDING CONSENT AUTHORITY	
APPROVED DRAWINGS	
Consent Number BC. 100795A	
Signed	
Date	6.9.10
ALL WORK IS TO COMPLY WITH THE NZ BUILDING CODE DO NOT MAKE CHANGES WITHOUT PRIOR APPROVAL	

AMENDED

AMENDED

ARDEX WPM 001

Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane



Copies available on request.

PRODUCT DESCRIPTION

Ardex WPM 001 (Superflex Bathroom & Balcony Premixed 1 Part) is a tough, ready to use waterproofing membrane specifically designed for use under tiles. Ardex WPM 001 has been uniquely formulated with synthetic microfibres to increase its strength and eliminate the need for a separate reinforcement mat. Ardex WPM 001 is based on the most advanced acrylic polymer technology, and is totally resistant to re-emulsification once cured.

Ardex WPM 001 is flexible, safe to use, low in odour, and is fully compatible with polymer modified tile adhesives. Ardex WPM 001 is one of the fastest drying one part acrylic membranes on the market – normally ready to tile in 48 hours @ 23°C.

WPM 001 meets the Green Building Council of Australia Green Star IEQ-13 requirements for Architectural Sealant when tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in Various Materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

FEATURES/BENEFITS

- Fast drying Ardex WPM 001 can be tiled over in 48 hours in non critical areas*
- Liquid reinforced: Excellent strength, eliminates need for reinforcing mat
- Flexible: Accommodates normal building movement class 3 membrane as per AS/NZ 4858: 2004 Wet Area Membranes
- Advanced acrylic: Will not re-emulsify once cured
- Designed for tiling - Fully compatible with Ardex tile adhesive systems
- Water based, safe to use, low odour & easy cleaning
- CSIRO Appraisal #91 for undertile waterproofing in shower recesses
- Conforms to the requirements of AS/NZ 4858: 2004 Wet Area Membranes.
(Ref: CSIRO Report 3779)

*Critical areas include areas where the membrane is applied at greater than 0.5mm or over impermeable substances such as over bond breakers or incorporating other reinforcement. Longer drying times are necessary in these areas.

APPLICATION RANGE

Performance Levels

Commercial and residential

Location

Internal wet areas, balconies, decks, and other areas that will be tiled or otherwise protected from regular foot traffic.

Surfaces

Walls & floors

Substrates

Concrete Cured for min. 28 days or sealed when set with one coat of Ardex WPM 300 (HydrEpoxy 300) at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. External wet concrete should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.

Renders and screeds Cured for min. 7 days or sealed when set with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight. Wet render should be allowed to dry thoroughly or sealed with one coat of Ardex WPM 300 as above.

Fibre cement Suitable for wet area grade fibre cement.

Plasterboard Wet area grade only.

Plywood Structural plywood (PAA branded), marine grade or other wet area grade only.

Particleboard Wet area grade, internal use only (special preparation is required – contact Ardex).

Permanent Immersion In conditions of permanent immersion, it is recommended that Ardex WPM 002 (Superflex Two Part) is used. Must be covered with tiles for full immersion.

Contact Ardex for use over existing membranes, covering materials, and any other substrates not listed.

SPECIFICATION CLAUSE

ARDEX WPM 001 (Superflex Premixed)

The waterproofing membrane shall be Ardex WPM 001: a one part acrylic modified fibre reinforced membrane formulated to provide a tough, long lasting water barrier under tiling systems.

PACKAGING

Single component: 20kg (approx 15 litres) or 6.5kg (approx 5 litres).

TABLE 1

	Thickness per Coat		Total Dry Film Thickness (2 coats)	Theoretical Coverage		Per Unit
	Dry Film	Wet Film		Per coat	For 2 coats	
FLOORS	0.5mm	1.0mm	1.0mm	15m ²	7.5m ²	20kg(15L) unit
WALLS	0.25mm	0.5mm	0.5mm	30m ²	15m ²	20kg(15L) unit

SHELF LIFE

12 months when stored in the original unopened packaging, in a dry place at 23°C. Do not store in direct sunlight. Replace lid tightly after use. Use remaining contents from part used containers within 3 months.

COVERAGE

Two coats are recommended for an effective waterproof membrane.

Coverage will vary depending on the porosity of the surface.

One 20kg (15 litre) unit will cover approximately 7.5-15m² (based on two coats) depending on area requirements between wall and floor surfaces to be treated. Refer Table 1.

DRYING TIMES

Recoat time

1-2 hours at (23°C/50% RH) between first and second coats. Alternatively, if a polyester mat is used between coats then the second coat can be applied whilst the first coat is still wet.

Dry through

The slowest drying areas are those where the membrane has been applied over a silicone bond breaker, eg. wall and floor junctions. The membrane cannot be tiled over until these critical areas are completely dry. Ardex WPM 001 is totally dry in 48 hours at 23°C/50% RH, but can take up to 72 hours at 10°C/50% RH in corners or for thick films.

Fully cured

The shower should not be used until the membrane has reached its full strength. Ardex WPM 001 membrane is fully cured after 3 days at 23°C, or after 5 days at 10°C.

Drying times will vary depending on humidity, surface temperature and surface porosity.

Do not apply on substrates where the surface temperature is below 10°C or above 35°C.

CLEANING

Wash hands, brushes, rollers, etc, with water while the membrane is still fresh. Remove cured material with mineral turpentine.

SAFETY PRECAUTIONS

Do not use the product in the following situations:

- Areas subject to negative hydrostatic pressure or rising damp, unless treated with Ardex WPM 300.
- Where the substrate is wet – wet surfaces can be sealed with one coat of Ardex WPM 300 at a coverage rate of 3.0 square metres per litre and allowed to cure overnight.
- Where rain is imminent.
- Where the membrane will be left exposed and subjected to regular foot traffic.
- On glazed, glass or other totally impervious surfaces (eg. areas pre-treated with water repellants).
- Where the surface temperature is below 10°C or greater than 35°C.
- All floor areas must have adequate falls either built into the substrate or achieved with a sand/cement screed prior to application of the Ardex WPM 001.

For substrates or situations other than those listed contact Ardex.

SAFETY DATA

Ardex WPM 001 is non-hazardous and non dangerous. It may produce discomfort of the eyes, respiratory tract and skin. Do not breathe gas/fumes/vapour/spray. Avoid contact with skin. Wear eye/face protection. In case of contact with eyes, rinse with plenty of water and seek medical advice.

ADDITIONAL INFORMATION IS LISTED IN THE MATERIAL SAFETY DATA SHEET.

QUALITY PRODUCT

Ardex WPM 001 is manufactured and tested to Ardex procedures which are maintained in accordance with Quality System Standard ISO 9001.

ARDEX WPM 001

Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane

USER NOTES

The technical details and recommendations contained in this data sheet are given in good faith and represent the best of our knowledge and experience at the time of printing. It is the responsibility of the user to ensure that the product is used in accordance with Ardex instructions and in applications for which they are intended.

APPLICATION

Apply Ardex WPM 001 by brush or roller. A medium nap (12-15mm pile) paint roller is recommended. New rollers should be dampened with water before being used for the first time.

For best results with a paint brush use a good quality, 50mm long bristle variety.

To achieve the required dry film thickness per coat, application must consist of laying the product onto the surface and light finish the surface. Do not try to apply in the same manner as a building paint. A conventional building paint is normally applied at 25-40 micrometers wet film thickness while Ardex WPM 001 needs to be applied at between 0.5 and 1.0 mm per coat depending on product and application (Refer Table 1).

Critical Areas:

INTERNAL WET AREAS

1. Construction should be in accordance with Australian 3740 - 2004 Waterproofing of wet areas within residential buildings.
2. All render and tile bed requirements should be completed before application of the membrane and tiles or other floor coverings should be direct bonded to the membrane.
3. Ensure wall & floor sheets are installed as per sheet manufacturer's recommendations.
4. Ensure suitable brick/concrete hobs are used (do not use timber).

5. Ensure that falls to the waste are min 1:60 (ie. approx. 30mm in 2mtr)) before waterproofing. Ensure outlet pipes are fixed securely and that the waste or drainage flanges are recessed into the floor.
6. Avoid sheet joints in shower recess floor. Ensure that sheets are securely fixed to the wall at the bottom edge, and sheet joints are sealed with a neutral cure silicone sealant spread approximately 6mm on either side of the joint.
7. Treat nail and screw holes with neutral cure silicone sealant.
8. Seal the perimeters of taps, shower outlets and waste outlets with neutral cure silicone sealant.
9. Apply a bead of neutral cure silicone sealant to all horizontal and vertical corners.
10. Apply a bead of neutral cure silicone sealant to the junction of the hob or angle and walls. Spreading the sealant to 6mm on either side of the joint.
11. Waste outlets shall incorporate a puddle flange or similar in accordance with AS3740 & the top surface shall be set flush with the surface to which the membrane is to be applied. A bead of neutral cure silicone shall be applied across the intersection of the puddle flange and the screed/floor.
12. Apply the membrane to the entire shower recess floor and down into waste or drainage flange. Apply the membrane over the hob and at least 150mm beyond the outside edge of the hob (ideally to entire wet area floor).
13. Apply the membrane 1800mm up the walls or to the height of the shower rose within the shower recess.
14. Install the shower screen to inside edge of the hob.

Fig.1 – Shower Recess – Critical Areas

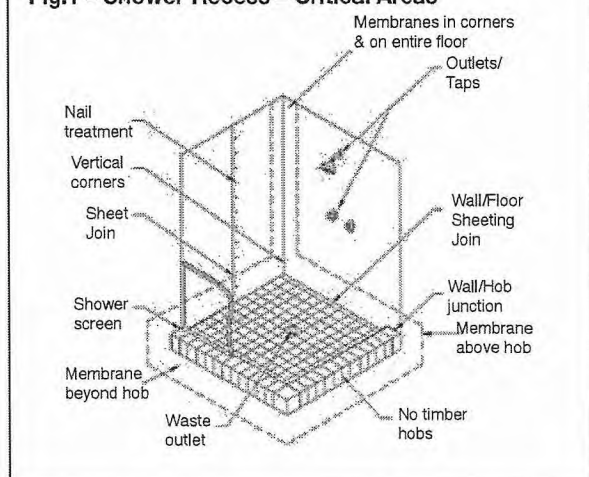
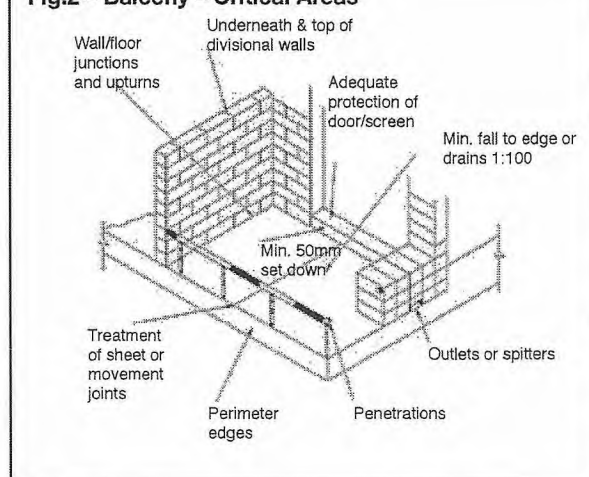


Fig.2 – Balcony – Critical Areas



BALCONIES AND DECKS

1. Ensure that the deck is constructed with falls to edge/drains of min 1:100 (ie. 20mm in 2m) or else achieve the fall with a sand/cement screed.
2. Ensure a min set down (step down) of 50mm to the finished floor level (ie. top of tiles).
3. Ensure suitable flashing is installed, ideally prior to the installation of the balcony screen/ sliding door.
4. Treat any sheet joints with a neutral cure silicone prior to waterproofing.
5. Prepare and seal all wall/floor junctions with a bead of neutral cure silicone.
6. Apply the membrane up the step down and as far up underneath the screen door flashing as possible (ideally waterproof prior to installing door).
7. Where possible, apply the membrane prior to building divisional walls, or other items such as planter boxes.
8. Apply the membrane to the entire balcony floor and at least 50mm up the wall above the top surface of the finished tiles and finished below the wall drainage vents.
9. Apply the membrane to the top of the parapets and divisional walls, or else install suitable metal capping.
10. Apply the membrane down over the front edge of the balcony onto the drip rail.
11. Carefully seal any gaps around balcony penetrations prior to applying the membrane.
12. Apply the membrane down into outlets and drains, ensuring excess material is removed.
13. Ensure all weep holes are above the membrane application area.

APPLICATION NOTES

Surface preparation

- Ensure all surfaces are structurally sound and totally dry. The pores of concrete surfaces should be open (absorbent surface). All sheet substrates must be securely fixed in accordance with the manufacturers instructions.
- Falls to outlets of at least 1:60 or approx. 30mm in 2mtr (wet areas) or 1:100 externally, must be achieved prior to tiling.
- The surface to be coated should be free from dust, oil, paint, curing compounds and any other contaminating materials.
- Damaged concrete should be repaired (leveled) and surface defects including all cracks and sharp protrusions should be treated prior to the application of the membrane.

- Remove laitance on concrete or screeds by mechanical means.
- Highly dense (>40MPa) or steel trowelled concrete should be roughened by suitable mechanical means (shot blasting, grinding, etc).

Priming

The primer is a critical part of the waterproofing system. Apply one coat of Ardex WPM 265 (Sheltercoat/ Superflex Water Based Primer) by brush or roller to all areas to be waterproofed including the floor waste. Allow the primer to completely dry prior to the application of the Ardex WPM 001 membrane. This will take around 20-30 minutes depending upon weather conditions and porosity of the substrate. Coverage is approximately 6m² per litre. Plastic (eg. PVC) pipes should be primed with a solvent based plumbers pink primer. Prime metal surfaces with a suitable metal primer such as epoxy polyamide primer.

GENERAL APPLICATION

Crack preparation

Cracks <2mm:

Clean and remove any loose particles in the crack. Prime the crack and adjacent area carefully with Ardex WPM 265 and allow to dry before applying two coats of Ardex WPM 001 membrane in a band at least 200mm wide equidistantly across the crack, along the length of the crack.

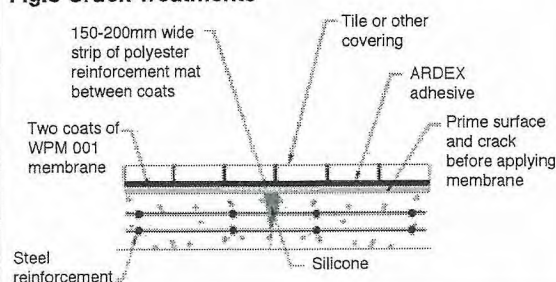
Cracks 2-6mm:

(Refer Fig. 3) Prepare and prime the crack as above. Apply a bead of neutral cure silicone into the crack and extend it 6mm either side. Apply a 300mm wide band of Ardex WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of Ardex "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the cloth preferably using a fluted roller, and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Cracks >6mm:

Contact your local Ardex representative.

Fig.3 Crack Treatments



ARDEX WPM 001

Superflex Bathroom & Balcony Premixed - 1 Part Undertile Waterproofing Membrane

Movement/construction joints

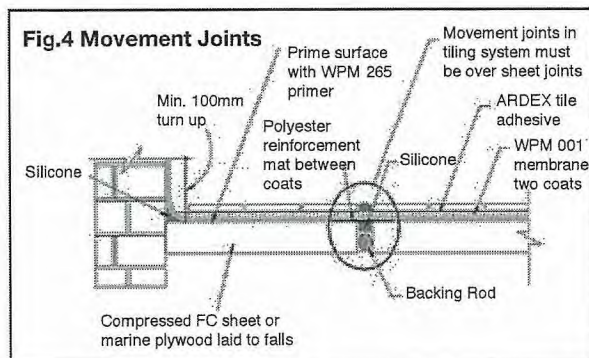
Movement joints (<6mm)

Use same procedure as in crack preparation.

Clean and prime the joint before filling it with a bead of neutral cure silicone and extending it 6mm each side of joint. Apply a 300mm wide band of Ardex WPM 001 equidistantly across the crack along the entire length of the crack. Place a 190mm wide band of Ardex "Deckweb" polyester woven cloth reinforcement over the applied membrane. Thoroughly wet out the mat and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat.

Construction joints (>6mm)

Use the same procedure as above, but replace the reinforcing mat with 120mm of Ardex Coving Bandage. Note: if tiling, movement joints should be taken to the surface of the tiles. Fill the joints between the tiles immediately above the movement joints with an appropriate joint sealant. (Refer Fig.4)



Corners & coving areas

After priming with Ardex WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates in coving areas and corners. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry.

Apply a first coat of Ardex WPM 001 to the area and allow the membrane to dry.

Apply a second coat ensuring that excess product is removed from the junction (the final dry film thickness should be minimum of 1.0mm). Alternatively, if a polyester reinforcement mat is used between coats then the second coat can be applied as soon as the mat is fully bedded into the first coat.

WALL/FLOOR JUNCTION

After priming with Ardex WPM 265 and allowing to dry, apply a generous bead (12mm) of neutral cure silicone sealant to seal all junctions between two substrates. Smooth over the silicone so that it extends 6mm up the wall and 6mm over the floor and allow to touch dry. Place a 190mm wide band of Ardex "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. The Ardex WPM 001 should be applied to at least 100 mm up the wall surfaces as per the recommendations for the application of Ardex WPM 001 to floors.

Walls

Two coats of Ardex WPM 001 are required to achieve a minimum total dry film thickness of 0.5mm.

After priming with Ardex WPM 265 and allowing to dry, apply two coats of Ardex WPM 001 (to achieve a minimum dry film thickness of 0.5mm) in two opposite directions. Wall sheet joints should be treated with a neutral cure silicone, PVC duct tape or base jointing compound. In balcony situations take the membrane up underneath any existing cover flashing or install appropriate flashing. Allow the first coat to dry before applying the second coat.

Floors

Two coats of Ardex WPM 001 are required to achieve a minimum total dry film thickness of 1.0mm. The flooring recommendations should be extended at least 150 mm up all perimeter walls.

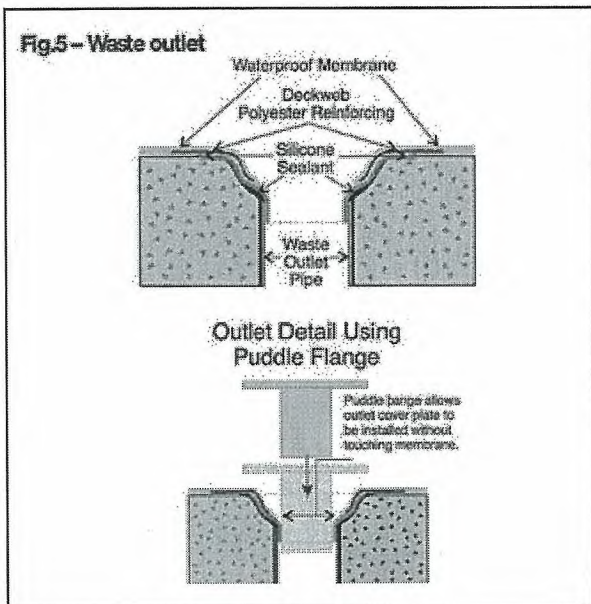
Prime the surface with Ardex WPM 265 and allow to dry.

Apply the first coat over the primed surface and allow it to dry (1-2 hours at 23°C, 50%RH) before applying a second coat in an opposite direction. In shower recesses a drainage flange must be installed on all timber/sheeted floors, and are strongly recommended on all other substrates. Where possible rebate the flange into the floor. Seal the perimeter of the flange with neutral cure silicone treatment. If a flange is not installed the membrane must be applied down into the pipe. (Refer Fig.5) Allow the membrane to dry completely before tiling. Refer drying times above.

Waste Outlet

Prime the surface with Ardex WPM 265 and allow to dry. Surfaces of the outlet flange must be primed with an appropriate primer.

Apply Ardex WPM 001 over the adjacent floor surface extending down into the waste outlet flange overlapping the edge of flange by at least 30mm. Place Ardex "Deckweb" polyester woven mat reinforcement over the applied membrane. Thoroughly wet out the cloth and remove all creases in, or air pockets under the mat. Immediately apply a second coat to completely fill the mat. (Refer Fig. 5)

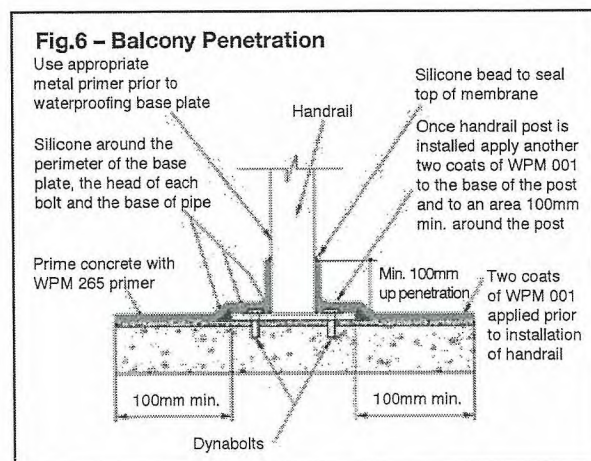


Balcony penetrations (Refer Fig.6)

All upstands are to be mechanically fixed through the membrane, which must be fabricated with a base plate flange.

Prime the metal with an appropriate metal primer such as an epoxy polyamide primer and allow to dry. Apply a 10mm bead of neutral cure silicone around the perimeter of the penetration. Apply the first coat of Ardex WPM 001 on the substrate and the flanged metal.

Allow first coat to dry before applying a second coat ensuring a finished dry film thickness of no less than 1.0mm is achieved. Place a suitable flashing collar around the penetration sealing it with a suitable sealant.



Tiling systems

It is advisable to conduct a flood test of the shower once the membrane has cured (normally after 72 hours), and before the tiling commences. A broad range of Ardex tile adhesives can be used over Ardex membranes. Contact Ardex or your nearest Ardex stockist for advice on the most suitable system.

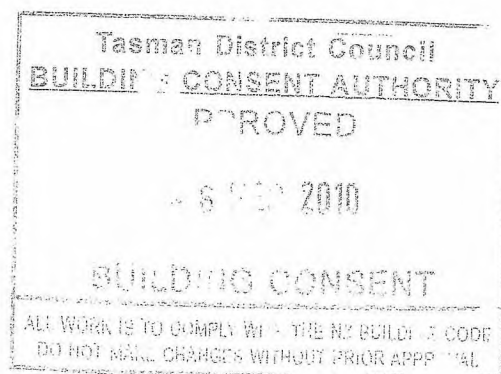
TECHNICAL DATA

Ardex WPM 001 (Superflex Premixed) Characteristics of liquid

Form & Colour	Blue viscous paste
Type	Single part
Specific Gravity	Approx. 1.34kg/litre
pH of Liquid	8.5
Viscosity of Liquid (RVT Brookfield, spindle 7 speed 10)	52,000cps
Non Volatile Matter (volume) AS1321.10	50.3%±1
Tensile Strength 7 days dry AS1145	1.04 MPa
Full Cure	1.92 MPa
Elongation at Break 7 days dry AS1145	780%

Conforms to requirements of class 3 membrane of AS/NZ 4858: 2004 Wet Area Membranes.

NOTE: Most of the tests have been carried out in the Ardex laboratory under standard conditions (23±2°C, 50±5% R.H)





BRANZ Appraised

Appraisal No.472 [2005]

BRANZ Appraisals

Technical Assessments of products
for building and construction

BRANZ APPRAISAL CERTIFICATE No. 472 (2005)

SUPERFLEX™ WET AREA MEMBRANES

Ardex New Zealand Ltd

P O Box 19549

Woolston

Christchurch

Tel: 03 384 3029

Fax: 03 384 9779



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

BRANZ Pty Ltd
P O Box 830
Brookvale
NSW 2100
Australia
Tel: +61 2 9938 6011
Fax: +61 2 9938 6911
www.branz.com.au



Product

1.1 Superflex™ Wet Area Membranes are premixed and two-part, liquid applied waterproofing membranes for use under ceramic tiles in internal wet areas.



Scope

2.1 Superflex™ Wet Area Membranes have been appraised for use as waterproofing membranes for internal wet areas of buildings, within the following scope:

- on floor substrates of concrete, flooring grade particleboard, plywood, and fibre cement sheet tile underlay, and on wall substrates of wet area fibre cement sheet lining systems and wet area plasterboard lining systems; and,
- when protected from physical damage by ceramic tiles; and,
- where floors are designed and constructed such that deflections do not exceed 1/360th of the span.

2.2 The use of Superflex™ Wet Area Membranes on concrete slabs where hydrostatic or vapour pressure is present is outside the scope of this Certificate.

2.3 Movement and control joints in the substrate must be carried through to the tile finish. The design and construction of the substrate and movement and control joints is specific to each building and therefore the responsibility of the building designer and building contractor and is outside the scope of this Certificate.

2.4 Ceramic tile finishes are outside the scope of this Certificate.

2.5 The products must be installed in accordance with the Ardex New Zealand Ltd Technical Literature referred to in Paragraph 6.1 and by Ardex trained and approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Superflex™ Wet Area Membranes if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 (b) 15 years. Superflex™ Wet Area Membranes meet this requirement. See Paragraph 9.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.6. Interior wet area floors and walls incorporating Superflex™ Wet Area Membranes will meet this requirement. Paragraphs 11.1 – 11.7.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Superflex™ Wet Area Membranes meet this requirement and will not present a health hazard to people.

3.2 This Certificate appraises an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

4.1 Materials supplied by Ardex New Zealand Ltd are as follows:

Superflex™ 1 Premixed Bathroom and Balcony

- A one part, polymer-based, ready-to-use, liquid-applied membrane containing micro-fibres, supplied as a light blue thixotropic paste in 6.5 kg (approximately 5 litres) and 20 kg (approximately 15 litres) pails.

Superflex™ 3 Two Part Bathroom and Balcony

- A fast drying, two part, flexible, cementitious-based, liquid applied membrane containing micro-fibres. It is supplied as Superflex™ 3 Part A Liquid in 10 and 20 kg pails and Superflex™ 3 Part B Powder in 10 kg multi-wall bags. When dry, the membrane is light grey in colour.

Superflex™ Primer

- A water-based primer used to seal substrates and enhance the adhesion of the membranes. It is supplied as a red coloured liquid in 20 kg plastic containers.

Handling and Storage

5.1 All materials must be stored inside, up off concrete floors, in dry conditions, out of direct sunlight and out of freezing conditions. The membrane products have a shelf life of 12 months from date of manufacture in the original unopened packaging. Once opened, the products must be used within 3 months.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Superflex™ Wet Area Membranes. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

Design Information

General

7.1 Superflex™ Wet Area Membranes are for use in buildings where an impervious waterproof membrane is required to floors and walls to prevent damage to building elements and adjoining areas.

7.2 Superflex™ 3 Two Part is designed to be used where a quicker curing time is required, such as in cool or humid conditions.

7.3 The membranes must be protected from physical damage by the application of ceramic tile finishes.

7.4 Movement and control joints may be required depending on the shape and size of the building or room, and the tile finish specified. Design guidelines can be found in the BRANZ Tiling Good Practice Guide.

7.5 Timber framing systems must comply with NZS 3604,

or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of NZS 4203. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported. Timber framing systems supporting the substrates must be constructed such that deflections do not exceed 1/360th of the span. Where NZS 3604 is used, the allowable joist spans given in Table 7.1 shall be reduced by 20%.

Substrates

Plywood

8.1 Plywood must be a minimum of 17mm thick complying with AS/NZS 2269, CD Grade Structural with sanded C face upwards and treated to H3 (CCA treated). LOSP treated plywood must not be used. The plywood must be supported with dwangs or framing with a maximum span of 400mm in each direction, fixed with 10g x 50mm stainless steel countersunk head screws at 150mm centres on the edges and 200mm through the body of the sheets.

Fibre Cement Compressed Sheet/ Fibre Cement Sheet Tile Underlay

8.2 Fibre cement compressed sheet must be manufactured to comply with the requirements of AS 2908.2 and must be specified by the manufacturer as being suitable for use as a wet area substrate. Fibre cement sheet tile underlay must be covered by a valid BRANZ Appraisal Certificate for use in internal wet areas. Installation must be in accordance with manufacturer's instructions.

Particleboard

8.3 Particleboard must be specified for the end use in accordance with NZS 3602.

Concrete and Concrete Masonry

8.4 Concrete and concrete masonry substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101 and NZS 3604 Concrete Slab-On-Ground Floors and Concrete masonry to NZS 4229 and NZS 4230.

Wet Area Wall Linings

8.5 Plasterboard wall linings must be manufactured to comply with AS/NZS 2588, and be covered by a valid BRANZ Appraisal Certificate for use in internal wet areas.

8.6 Fibre Cement Sheet must be covered by a valid BRANZ Appraisal Certificate for use in wet areas.

Durability

Serviceable Life

9.1 The Superflex™ Wet Area Membranes, when subjected to normal conditions of environment and use, are expected to have a serviceable life of at least 15 years and be compatible with tile finishes with a design service life of 15-25 years.

Maintenance

10.1 No maintenance of the membranes will be required provided significant substrate movement does not occur and the tile finish remains intact. Regular checks must be made of the tiled areas to ensure they are sound and will not allow moisture to penetrate. Any cracks or damage must be repaired immediately by repairing the tiles, grouts and sealants.

10.2 In the event of damage to the membranes, the tiling must be removed and the membrane repaired by removing the damaged portion and applying a patch as for new work.

10.3 Drainage outlets must be maintained to operate effectively, and tile finishes must be kept clean.

Internal Moisture

11.1 Superflex™ Wet Area Membranes when fully cured are impervious to water and when appropriately designed and installed will avoid the likelihood of water penetrating behind linings or entering concealed spaces.

11.2 Superflex™ Wet Area Membranes are suitable for use to achieve constraint of accidental overflow to meet NZBC Clause E3.3.2. A means of Code Compliance is given in NZBC Acceptable Solution E3/AS1 Paragraph 2.

11.3 Surfaces must be finished with ceramic tiles. A means of Code Compliance to NZBC Clause E3.3.3 is given in Acceptable Solution E3/AS1 Paragraph 3.1.1 (b) and 3.1.2 (b).

11.4 Falls in showers and shower areas must be a minimum of 1 in 50. In unenclosed showers, falls must extend a minimum of 1500 mm out from the shower rose. Floor wastes must be provided and the floor must fall to the outlet.

11.5 The waterproofing membrane must completely cover shower bases, and for unenclosed showers it must extend a minimum of 1500 mm out from the shower rose. Further design guidance on waterproofing wet areas, including waterproofing walls and junctions can be obtained from AS 3740, the BRANZ Tiling Good Practice Guide, and flooring and wallboard manufacturers.

11.6 Where water resistant wall finishes such as prefinished sheet materials are used, they must flash over the membrane a minimum of 30mm.

11.7 BRANZ recommends the entire floor be covered by a waterproof membrane for bath, shower and spa rooms where timber, plywood or particleboard floors are used. This is also a requirement of particleboard manufacturers.

Installation Information

Installation Skill Level Requirement

12.1 Installation of the membranes must be completed by approved applicators who have completed and passed the Ardex New Zealand Ltd training programme

12.2 Installation of substrates must be completed by tradespersons with an understanding of internal wet area construction, in accordance with instructions given within the Ardex New Zealand Ltd Technical Literature and this Certificate.

Preparation of Substrates

13.1 Substrates must be dry and clean before installation commences. Surfaces must be even and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents.

13.2 Concrete substrates can be checked for dryness by using a hygrometer as set out in BRANZ Bulletin No. 424. The relative humidity of the concrete must be 75% or less before membrane application.

13.3 All voids, cracks, holes, joints and excessively rough areas must be filled to achieve a smooth and uniform surface. Junctions of substrate abutments, such as at wall/floor junctions must have a bond breaker joint system installed as set out in the Technical Literature.

13.4 Substrates must be primed with Superflex™ Primer and allowed to cure before the membrane is installed.

Membrane Installation

14.1 Installation must not be undertaken where the substrate surface temperature is below 10°C or above 35°C.

14.2 Superflex™ 3 Two Part Bathroom and Balcony liquid and dry components must be mixed and left to stand for 5 minutes before re-mixing, then applying. Superflex™ 1 Premixed Bathroom and Balcony must be thoroughly stirred before application.

14.3 The membrane must be applied in a minimum of two coats at the rates set out in the Technical Literature to give a total finished thickness of 1.2 – 1.5 mm. Subsequent coats must be applied at an opposite direction to the previous coat.

14.4 Application can be made by roller (medium/long nap), brush (long bristle), or a flat steel trowel.

14.5 Reinforcement fabric is bedded into the wet layer between coats to provide movement protection at wall/wall and wall/floor junctions, and at any other areas such as joints in the flooring substrate, floor cracks or around penetrations in the membrane.

14.6 Clean up may be undertaken with water.

Tiling

15.1 The membrane must be fully cured before tiling. The cured membrane must be protected at all times to prevent mechanical damage, so may require temporary covers until the finishing is completed.

15.2 Tiling must be undertaken in accordance with AS 3958.1 and the BRANZ Good Tiling Practice Guide. The compatibility of the tile adhesive must be confirmed with the adhesive manufacturer or Ardex New Zealand Ltd.

Inspections

16.1 The Technical Literature must be referred to during the inspection of membrane installations by Building Consent Authorities and Territorial Authorities.

16.2 Critical areas of inspection for waterproofing systems are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions, particularly installation to the correct thickness.
- Membrane curing and integrity prior to the installation of tiles including protection from mechanical damage during curing and prior to tile installation.

Health and Safety

17.1 Safe use and handling procedures for the membrane systems are provided in the Technical Literature. The products must be used in conjunction with the relevant materials safety data sheet for each membrane.

Basis of Appraisal

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

Tests

18.1 The following testing of Superflex™ 1 Premixed Bathroom and Balcony and Superflex™ Two Part Bathroom and Balcony has been undertaken by Ardex Australia Pty Ltd research and development laboratory: water vapour transmission; water absorption; tensile strength and elongation before and after UV exposure, immersion in bleach, immersion in industrial detergent and immersion in water. Test methods and results were reviewed by BRANZ and found to be satisfactory.

18.2 The following testing of Superflex™ 1 Premixed Bathroom and Balcony was undertaken by the Commonwealth Scientific Industrial Research Organisation (CSIRO) Australia:

- In accordance with ANSI A118.10 for ICBO Evaluation Service - dimensional stability; waterproofness; shear strength to ceramic tile and cement mortar; and fungal and micro-organism resistance.
- In accordance with AS 1145 - behaviour under cyclic strain.

Test methods and results were reviewed by BRANZ and found to be satisfactory.

18.3 Testing of Superflex™ 1 Premixed Bathroom and Balcony and Superflex™ 3 Two Part Bathroom and Balcony has been undertaken by BRANZ for low temperature flexibility and peel adhesion after heat/humidity aging.

18.4 Testing for suitability over particleboard in accordance with AS/NZS 4858-2004, Appendix C has not been undertaken because compliance with the standard has been met by satisfactory water vapour transmission test results.

Other Investigations

19.1 An assessment was made of the durability of the Superflex™ Wet Area Membranes by BRANZ technical experts.

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

19.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

20.1 The manufacture of the Superflex™ products by Ardex Australia Pty Ltd has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

20.2 The quality management system of Ardex Australia Pty Ltd has been assessed and registered as complying with the requirements of AS/NZS ISO 9001:2000 by SAI Global, Certificate Number QEC1219.

20.3 The quality of manufacture of the Superflex™ products is the responsibility of Ardex Australia Pty Ltd.

20.4 The quality of supply of the Superflex™ products to the market is the responsibility of Ardex New Zealand Ltd.

20.5 Quality on site is the responsibility of the trained and approved applicators.

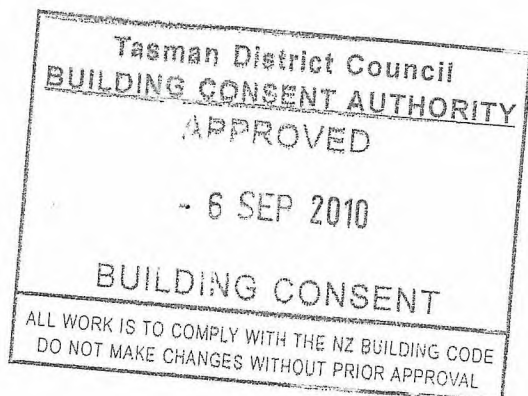
20.6 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Ardex New Zealand Ltd and this Certificate.

20.7 Building owners are responsible for the maintenance of the tiling systems in accordance with Ardex New Zealand Ltd's instructions.

AMENDED

Sources of Information

- AS 2908.2: 2000 Cellulose-cement products - flat sheet.
- AS 3740 - 2004 Waterproofing of wet areas within residential buildings.
- AS 3958.1 1991 Guide to the installation of ceramic tiles.
- ASTM D2919-01 Standard test method for determining durability of adhesive joints stressed in shear by tension loading.
- AS/NZS 4858 - 2004 Wet area membranes.
- AS/NZS 2269:1994 Plywood - Structural.
- NZS 3101: 1995 The design of concrete structures.
- NZS 3602: 2003 Timber and wood-based products for use in buildings.
- NZS 3604: 1999 Timber framed buildings.
- NZS 4229:1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230:1990 Code of practice for the design of masonry structures.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.
- Tiling Good Practice Guide, BRANZ, March 2004.
- Membrane Roofing Good Practice Guide, BRANZ, November 1999



In the opinion of BRANZ, Superflex™ Wet Area Membranes are fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided they are used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, Ardex New Zealand Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - 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 Certificate Holder:
 - 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 Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson
Chief Executive

Date of issue: 20 June 2005

AMENDED