

TIMBERED SERVICES PTY LTD

Provider of Educational Services related to Timber

Director, A/Prof Geoff Boughton

ACN 086 601 407

ABN 24 086 601 407

PO Box 30

Glengarry WA 6023

phone 041 921 3603

fax (08) 9246 3090

email: boughton@timber.org.au

SPAN TABLES FOR VERANDAH BEAMS AND VERANDAH RAFTERS from "MAXbeam" Structural Laminated Veneer Lumber

**Report for INDEPENDENT TIMBER SUPPLIES
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A/Prof Geoff Boughton

Director

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1. BACKGROUND

Independent Timber Supplies requested that TimberED Services produce span tables for ‘MAXbeams’ used as verandah beams and verandah rafters.

The properties of MAXbeam material was previously determined for the production of the Carport, ridge and alfresco beams. The same properties were used for this work.

Verandahs are roofed, and may have ceilings. A range of Roof Masses have been provided to accommodate all options. The beams required are:

- Verandah beams
- Rafters

Independent Timber Supplies indicated that tables would be required for

- 200 × 50, 240 × 50, 240 × 65 and 280 × 80 MAXbeams for verandah beams
 - continuous span tables were only required for the 200 × 50, 240 × 50 sizes, as the larger sizes were all limited by the maximum available lengths for continuous spans
 - a total roof and ceiling weight of 20, 40, 60 and 90 kg/m²
 - Roof Load Widths of 900, 1200, 1800, 2400, 3000 and 3600mm
 - rafter spacing at 600 and 900mm centres
- 100 × 50, 120 × 50, 200 × 50, 240 × 50 and 240 × 65 MAXbeams for verandah rafters
 - a total roof and ceiling weight of 20, 40, 60 and 90 kg/m²
 - rafter spacing at 450, 600, 900 and 1200 mm centres

Span tables have been produced in accordance with AS1684.1 for N1/N2 houses. Conventions and nomenclature used in the report are shown in Figure 1.

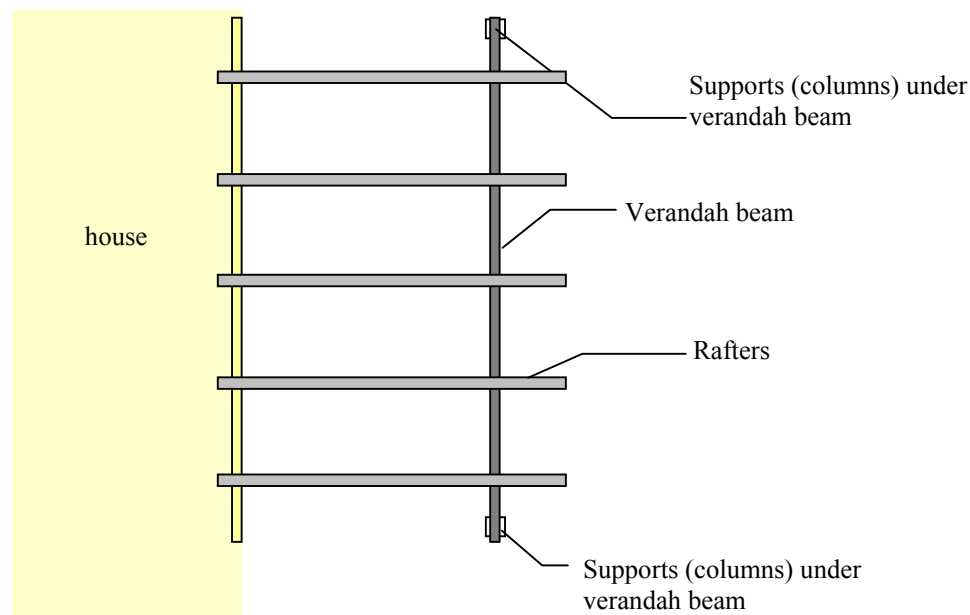


Figure 1 – Nomenclature used in Span Tables

2. PREPARATION OF SPAN TABLES

2.1 Properties

The following properties have been used in preparation of the span tables:

- $f'_b = 66.0 \text{ MPa}$
- $f'_s = 5.0 \text{ MPa}$
- $E = 18,500 \text{ MPa}$
- $\rho_b = 1.07$

These properties are consistent with the properties used in the preparation of previous span tables for the same material, and have been agreed with report by Jack Taylor (Monash University).

2.2 Basis of Span table preparation

The span tables were prepared using a spreadsheet that was created in accordance with the load cases, constraints and requirements for verandah beams and rafters in AS1684.1:1999.

- Verandah Beam tables complied with requirements for verandah beams – and considered both roof loads and ceiling loads.
- Verandah rafter tables were modelled on the requirements for roof rafters – and considered both roof loads and ceiling loads.

The following additional assumptions were made:

- AS1684 presents limits to overhangs on rafters, but for overhangs on verandah beams, a different method of sizing members is presented.
- For both verandah beams and rafters, it was assumed that both ceiling and roof were attached to the upper side of the beam. This gives lateral restraint only to the upper edge. It is a conservative assumption, and will provide a safe solution for the case of beams within the ceiling space, with the ceiling attached to the bottom edge of the beam and the roof attached to the top edge.

2.3 AS1684.1 Residential Timber Framed Construction – Design criteria

The design criteria for the preparation of the span tables were drawn from AS1684.1-1999.

The tables for the verandah beams require designers to calculate the roof load width. This distance is defined in AS1684.2-1999.

Bending moment, shear force and deflection calculations were performed for both single spans and continuous spans based on the theory of elasticity. Appropriate duration of load factors are defined in AS1684.1 to account for inelastic behaviour of timber.

3. SPAN TABLES

Preliminary span tables were prepared based on the results of running software that matched performance against the criteria shown in the Design Criteria document AS1684.1.

Verandah beams - Single span													
Rafter/Truss spacing		Roof Load Width (mm)											
		900		1200		1800		2400		3000		3600	
		600	900	600	900	600	900	600	900	600	900	600	900
Size D x B (mm)	Roof mass (kg/m ²)	Maximum Verandah Beam Span (mm)											
200x50	20	5300	5300	5000	5000	4600	4600	4300	4300	4000	4000	3800	3800
	40	4700	4700	4400	4400	4000	4000	3700	3700	3400	3400	3200	3200
	60	4300	4300	4000	4000	3600	3600	3300	3300	3000	3000	2800	2800
	90	4000	4000	3600	3600	3200	3200	2900	2800	2700	2600	2500	2500
240x50	20	6000	6000	5700	5700	5200	5200	4900	4900	4600	4600	4400	4300
	40	5400	5400	5000	5000	4600	4600	4300	4300	4000	4000	3800	3800
	60	4900	4900	4600	4600	4200	4200	3900	3900	3600	3600	3400	3400
	90	4500	4500	4200	4200	3800	3800	3500	3500	3200	3200	3000	3000
240 x 65	20	6000	6000	6000	6000	5500	5500	5100	5100	4900	4900	4600	4600
	40	5600	5600	5300	5300	4900	4800	4500	4500	4300	4300	4100	4100
	60	5200	5200	4900	4900	4500	4500	4200	4200	3900	3900	3700	3700
	90	4800	4800	4500	4500	4100	4100	3800	3800	3500	3500	3300	3300
280 x 80	20	6000	6000	6000	6000	6000	6000	6000	6000	5700	5700	5400	5400
	40	6000	6000	6000	6000	5700	5700	5300	5300	5000	5000	4800	4800
	60	6000	6000	5700	5700	5200	5200	4900	4900	4600	4600	4400	4400
	90	5600	5600	5300	5300	4800	4800	4500	4500	4200	4200	4000	4000

Notes:

- Verandah beams can be installed as exposed beams.
- Overhangs must be continuous with a back span of at least twice the overhang distance, and should be sized as a single span beam with a span of the largest of (three times the cantilever distance or the back span). See Clause 7.3.16 in AS1684.2.
- Members can only be sized as continuous spans if the adjacent spans are similar – ratio of the adjacent spans should be less than 2:1. For ratios greater than this, the member should be sized using the single span tables and the larger span.

Verandah beams - Continuous span													
Rafter/Truss spacing		Roof Load Width (mm)											
		900		1200		1800		2400		3000		3600	
		600	900	600	900	600	900	600	900	600	900	600	900
Size D x B (mm)	Roof mass (kg/m ²)	Maximum Verandah Beam Span (mm)											
200x50	20	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
	40	4800	4800	4800	4800	4800	4800	4700	4700	4400	4400	4200	4200
	60	4800	4800	4800	4800	4600	4600	4300	4300	4100	4100	3800	3800
	90	4800	4800	4700	4700	4200	4200	3900	3900	3600	3600	3400	3400
240x50	20	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
	40	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
	60	4800	4800	4800	4800	4800	4800	4800	4800	4700	4600	4400	4400
	90	4800	4800	4800	4800	4800	4800	4500	4500	4200	4200	4000	4000

Notes:

- Verandah beams can be installed as exposed beams.
- Overhangs must be continuous with a back span of at least twice the overhang distance, and should be sized as a single span beam with a span of the largest of (three times the cantilever distance or the back span). See Clause 7.3.16 in AS1684.2.
- Members can only be sized as continuous spans if the adjacent spans are similar – ratio of the adjacent spans should be less than 2:1. For ratios greater than this, the member should be sized using the single span tables with the larger span.
- Indicates continuous spans that are limited by the maximum available length (7.2m) of the timber. These spans can only be achieved in a continuous member if the adjacent spans are not equal. Spans of greater than 4.8m must be sized as single spans.
- These continuous spans are not limited by the maximum length of available timber, but will still require that adjacent spans are not equal.

Verandah Rafters		Rafter spacing															
Size DxB (mm)	Roof & Ceiling mass (kg/m ²)	450		600		900		1200		450		600		900		1200	
		Maximum Rafter or Purlin Span and Overhang (mm)															
		Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H	Span	O/H
		Single Span								Continuous Span							
100x50	20	4200	1000	3900	950	3500	900	3200	850	5700	850	5300	800	4800	750	4400	750
	40	3500	1050	3200	1000	2900	950	2600	950	4800	900	4400	900	3900	850	3600	850
	60	3100	1100	2900	1050	2500	1000	2300	950	4200	1000	3900	950	3400	900	3100	900
	90	2800	1150	2500	1050	2200	900	2000	850	3800	1000	3400	1000	3000	950	2800	900
120x50	20	4900	1200	4600	1100	4100	1050	3800	1050	6700	1000	6200	950	5600	950	5200	900
	40	4100	1300	3800	1200	3400	1150	3100	1100	5600	1100	5200	1050	4700	1000	4300	1000
	60	3700	1350	3400	1250	3000	1200	2800	1150	5100	1150	4700	1100	4100	1050	3800	1050
	90	3300	1400	3000	1250	2700	1150	2400	1000	4500	1200	4100	1150	3600	1100	3300	1100
200x50	20	7000	2050	7000	1900	6600	1750	6200	1700	7000	2050	7000	1900	7000	1700	7000	1650
	40	6600	2150	6200	2000	5600	1900	5100	1850	7000	2050	7000	1900	7000	1700	7000	1650
	60	6000	2200	5600	2100	5000	2000	4600	1950	7000	2050	7000	1900	6800	1750	6200	1700
	90	5400	2300	5000	2200	4400	1850	4000	1700	7000	2050	6800	1950	6000	1850	5500	1800
240x50	20	7000	2650	7000	2450	7000	2200	7000	2100	7000	2650	7000	2450	7000	2200	7000	2100
	40	7000	2650	7000	2450	6600	2300	6100	2200	7000	2650	7000	2450	7000	2200	7000	2100
	60	7000	2650	6600	2500	5900	2400	5400	2300	7000	2650	7000	2450	7000	2200	7000	2100
	90	6400	2750	5900	2500	5300	2250	4800	2050	7000	2650	7000	2450	7000	2200	6600	2150
240x65	20	7000	3000	7000	2750	7000	2500	7000	2350	7000	3000	7000	2750	7000	2500	7000	2350
	40	7000	3000	7000	2750	7000	2500	6600	2450	7000	3000	7000	2750	7000	2500	7000	2350
	60	7000	3000	7000	2750	6400	2600	5900	2500	7000	3000	7000	2750	7000	2500	7000	2350
	90	6900	2950	6400	2750	5700	2450	5200	2200	7000	3000	7000	2750	7000	2500	7000	2350

Notes:

- Verandah rafters can be installed as exposed beams with ceiling fixed above the rafter.
- Overhangs must be continuous with a back span of at least twice the overhang distance.

- Members can only be sized as continuous spans if the adjacent spans are similar – ratio of the adjacent spans should be less than 2:1. For ratios greater than this, the member should be sized using the single span tables with the larger span.

The span tables are valid provided the MaxBeam properties remain unchanged.



A/Prof Geoff Boughton
Director,
TimberED Services Pty Ltd
28th April, 2004



Debbie J Falck
Assistant,
TimberED Services Pty Ltd