Necessary Information Required to Select a Lintel with an E.L. less than 3.0m (e.g. Verandah Roofs).

This formula is suitable for all stress grades, for both seasoned and un-seasoned timber, and for both roof loadings. The formula is :-

$$Y = 1.06 \times X + 0.1$$

where, for a given set of parameters, X is the appropriate tabulated value for an E.L. of 3.0m and Y is the allowable span of lintel for an E.L. of 1.5m.

For example, for seasoned softwood stress grade F5, Tables 9S shows that for an E.L. of 3.0m, a 90 x 35 lintel can span 1.7m, when supporting rafters at 600mm spacing carrying a sheet roof. Thus for an E.L. of 1.5m, the allowable span of the same lintel would be 1.9m.
(Y = 1.06 x 1.7 + 0.1 = 1.9m)

For values of E.L. between 1.5 and 3.0, linear interpolation may be used.

Formula provided by:
COMMONWEALTH SCIENTIFIC & INDUSTRIAL RESEARCH ORGANISATION OF AUST.

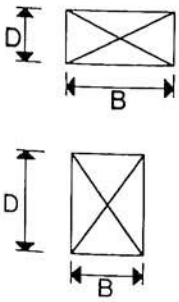

Table 9S

SEASONED SOFTWOOD - STRESS GRADE F5
LINTELS - Single or Upper Storey

Size * Depth x Breadth (mm)	Rafter or Truss Spacing (mm)	Allowable Span of Lintel (m)							
		Sheet Roofing				Tiled Roofing			
		Effective Roof Length EL (m) - Fig. 4.1							
		3.0	6.0	9.0	12.0	3.0	6.0	9.0	12.0
45 x 70	600	1.5	1.2	1.1	1.0	1.1	0.9	0.8	0.7
	1200	1.2	1.0	0.8	0.7	0.8	0.6	N S	N S
45 x 90	600	1.5	1.2	1.1	1.0	1.1	0.9	0.8	0.7
	1200	1.2	1.0	0.8	0.7	0.9	0.7	N S	N S
90 x 35	600	1.7	1.4	1.0	0.8	1.3	0.8	0.7	N S
	1200	1.0	0.8	0.7	N S	0.8	N S	N S	N S
90 x 45	600	1.8	1.5	1.1	1.0	1.4	0.9	0.8	0.6
	1200	1.2	0.9	0.7	0.6	0.9	N S	N S	N S
90 x 70	600	1.9	1.6	1.4	1.3	1.5	1.2	1.0	0.8
	1200	1.6	1.2	1.0	0.8	1.1	0.8	N S	N S

* Size must not be under that stated (no negative tolerance)
(Extract from Timber Framing Code - AS 1684 - 1992)

+ Bearing Area Required for Lintel : 50mm x Breadth of Lintel
‡ Bearing Area Required for Lintel : 75mm x Breadth of Lintel

Prepared by the
TIMBER DEVELOPMENT ASSOCIATION OF S.A. Inc.
for **STANDARDS AUSTRALIA**

Conversion Table of Allowable Span of Lintel Carrying 3.0m E.L. Roof (X) to Allowable Span of Lintel Carrying 1.5m E.L. Roof (Y) where Y = 1.06 x X + 0.1.

Note:- Example (4.4 x 1.06) + 0.1 = 4.764 *[round off to 4.8]*

	0.6	0.7	3.1	3.4
	0.7	0.8	3.2	3.5
	0.8	0.9	3.3	3.6
	0.9	1.1	3.4	3.7
	1.0	1.2	3.5	3.8
	1.1	1.3	3.6	3.9
	1.2	1.4	3.7	4.0
	1.3	1.5	3.8	4.1
	1.4	1.6	3.9	4.2
	1.5	1.7	4.0	4.3
	1.6	1.8	4.1	4.4
Example	**1.7 x 1.06 + 0.1 =**	**1.9**	4.2	4.6
	1.8	2.0	4.3	4.7
Example	1.9	2.1	**4.4 x 1.06 + 0.1 =**	**4.8**
	2.0	2.2	4.5	4.9
	2.1	2.3	4.6	5.0
	2.2	2.4	4.7	5.1
	2.3	2.5	4.8	5.2
	2.4	2.6	4.9	5.3
	2.5	2.8	5.0	5.4
	2.6	2.9	5.1	5.5
	2.7	3.0	5.2	5.6
	2.8	3.1	5.3	5.7
	2.9	3.2	5.4	5.8
	3.0	3.3	5.6	5.9
			5.6	6.0

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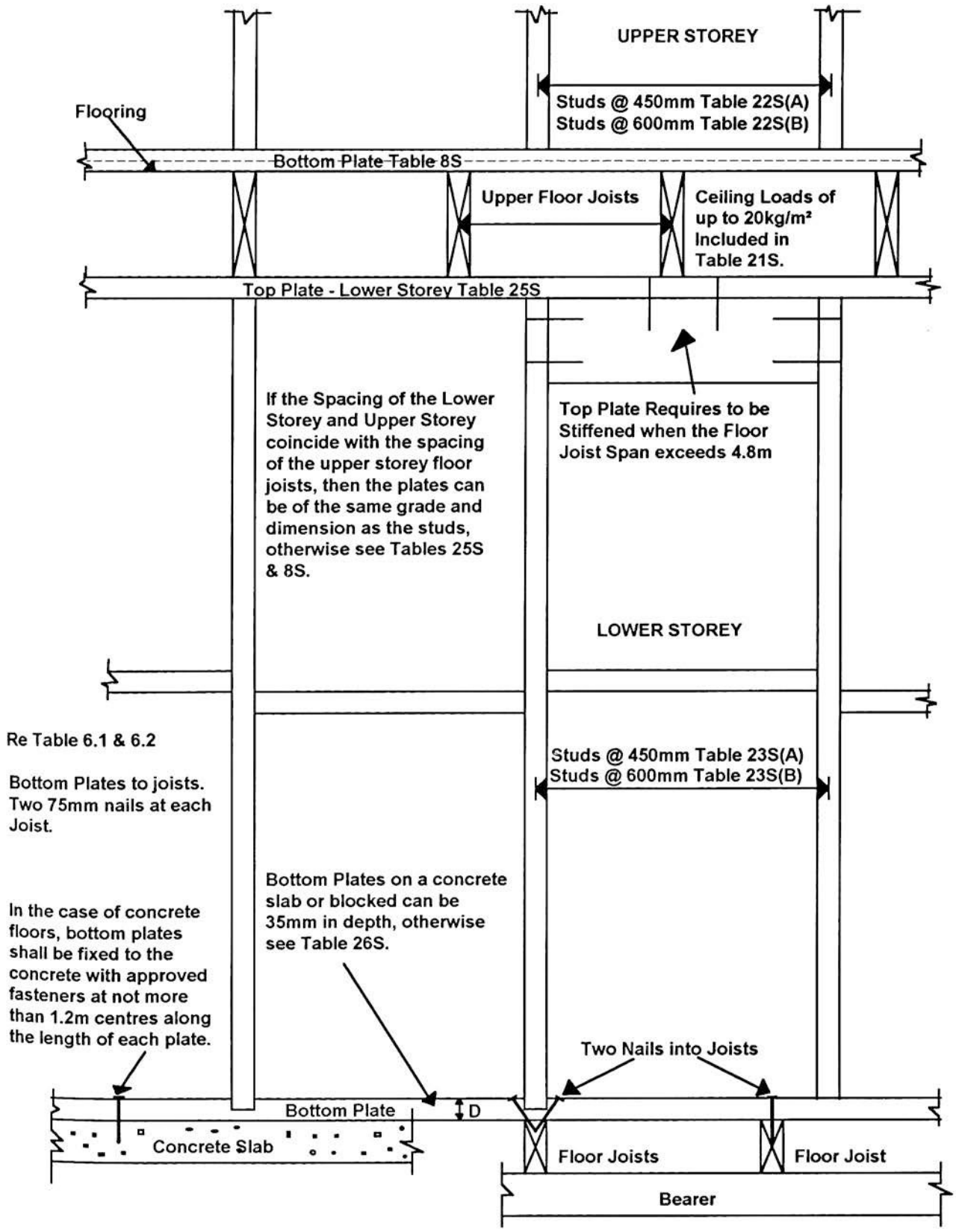
Typical Section for Two Storey Construction - Defining the Use of Tables.



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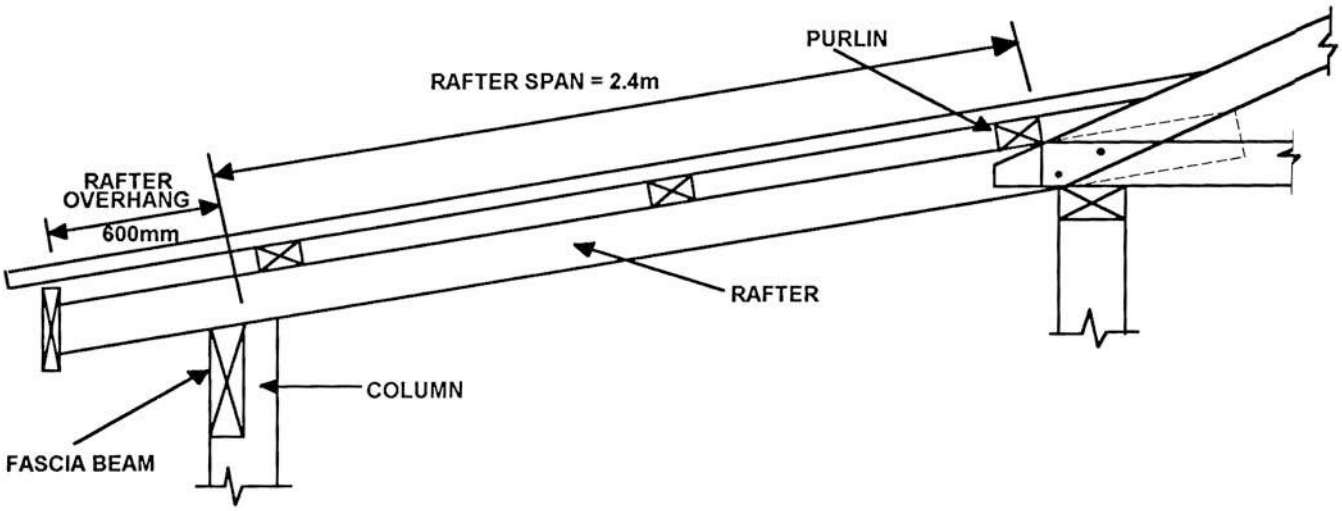
Necessary Information Required to Select a Fascia or Verandah Beam Not Supporting the Main Roof. (Rafter Overhang 600mm)



1.	Type of Timber	= **F5 Seasoned Softwood**
2.	Type of Roof	= **Sheet with Ceiling (20Kg/m²)**
3.	Rafter Span	= **2.4m + 600mm (Overhang)**
4.	Beam Spacing	= **Rafter Span ÷ 2 + Overhang**
		= **1.2m + 600 = 1.8m**
5.	Beam Span	= **3.2m**
6.	Beam Size	= **170mm × 45mm**

Where a Fascia or Verandah Beam is not supporting the Main Roof, and there are NO WINDOWS or DOORS between the columns, the Beam can be selected in accordance with the appropriate Roof & Ceiling Mass from Table 13S(A), 13S(B) or 14S. Consideration must be given when selecting Beams regarding the slenderness, or depth to breadth ratio. As in Lintels, a Beam should not be less than 50mm nominal thickness, less the dressing or clean sawing tolerance, and for spans over 2.1m., the depth should not be greater than four times the breadth, unless the bottom edge can be restrained. E.g. Bottom edge supported by a Ceiling Joist.

SEASONED SOFTWOOD - STRESS GRADE F5

Table 14S ROOF BEAMS (PRINCIPALS) FOR NON-TRAFFICABLE ROOFS

Size * Depth x Breadth (mm)	Mass of Roof (kg/m²)	Maximum allowable span (m) and overhang (m) of Rafter or Purlin for Spacing (mm) of							
		600		900		1200		1800	
		Span	OverHang	Span	OverHang	Span	OverHang	Span	OverHarg
170 x 35	10	4.3	2.46	4.1	2.27	3.9	1.96	3.5	1.61
	20	4.3	2.28	3.9	2.08	3.6	1.94	3.2	1.61
	40	3.6	1.94	3.2	1.75	2.9	1.62	2.6	1.46
170 x 45	10	4.7	2.59	4.4	2.39	4.2	2.25	3.9	1.99
	20	**4.7**	**2.41**	**4.2**	**2.21**	**3.9**	**2.06**	***3.4***	***1.86***
	40	3.9	2.06	3.4	1.86	3.2	1.73	2.8	1.56

* Size must not be under that stated.

(Extract from Timber Framing Code-AS1684-1992)

Prepared by the
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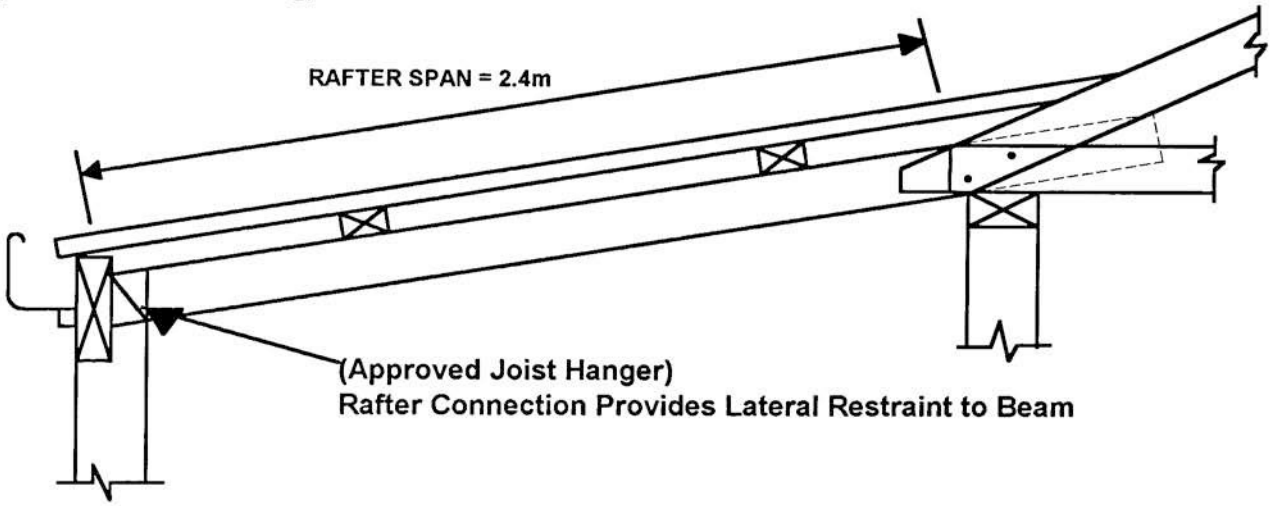
for **STANDARDS AUSTRALIA**

Necessary Information Required to Select a Fascia or Verandah Beam Not Supporting the Main Roof. (No Rafter Overhang)



1.	Type of Timber	= **F5 Seasoned Softwood**
2.	Type of Roof	= **Sheet Roof - No Ceiling (10 Kg/m²)**
3.	Span of Rafter	= **2.4m - No Overhang**
4.	Beam Spacing	= **Rafter Span ÷ 2 = 1.2m**
5.	Beam Span	= **Single Span 3.0m**
6.	Beam Size	= **140 x 35 (From Table 13S(A))**

Where a Fascia or Verandah Beam is not supporting the Main Roof and there are NO WINDOWS or DOORS between the columns, the Beam can be selected in accordance with the appropriate Roof & Ceiling Mass from Tables 13S(A), 13S(B) or 14S.

Table 13S (A)

SEASONED SOFTWOOD - STRESS GRADE F5

RAFTERS OR ROOFING PURLINS

Supported at Two Points Only

Size * Depth x Breadth (mm)	Mass of Roof (kg/m²)	Maximum allowable span (m) and overhang (m) of Rafter or Purlin for Spacing (mm) of							
		450		600		900		1200	
		Span	OverHang	Span	OverHang	Span	OverHang	Span	OverHang
120 x 45	10	3.3	0.83	3.2	0.71	2.9	0.56	2.8	0.47
	20	3.3	0.87	3.2	0.74	2.9	0.58	2.8	0.48
140 x 35	10	3.7	0.83	3.5	0.71	3.3	0.56	***3.0***	***0.47***
	20	3.7	0.87	3.5	0.74	3.3	0.58	3.0	0.48
190 x 35	10	5.0	1.08	4.8	0.92	4.6	0.72	4.3	0.60
	20	5.0	1.13	4.8	0.95	4.4	0.75	4.0	0.63

* Size must not be under that stated.

(Extract from Timber Framing Code-AS1684-1992)

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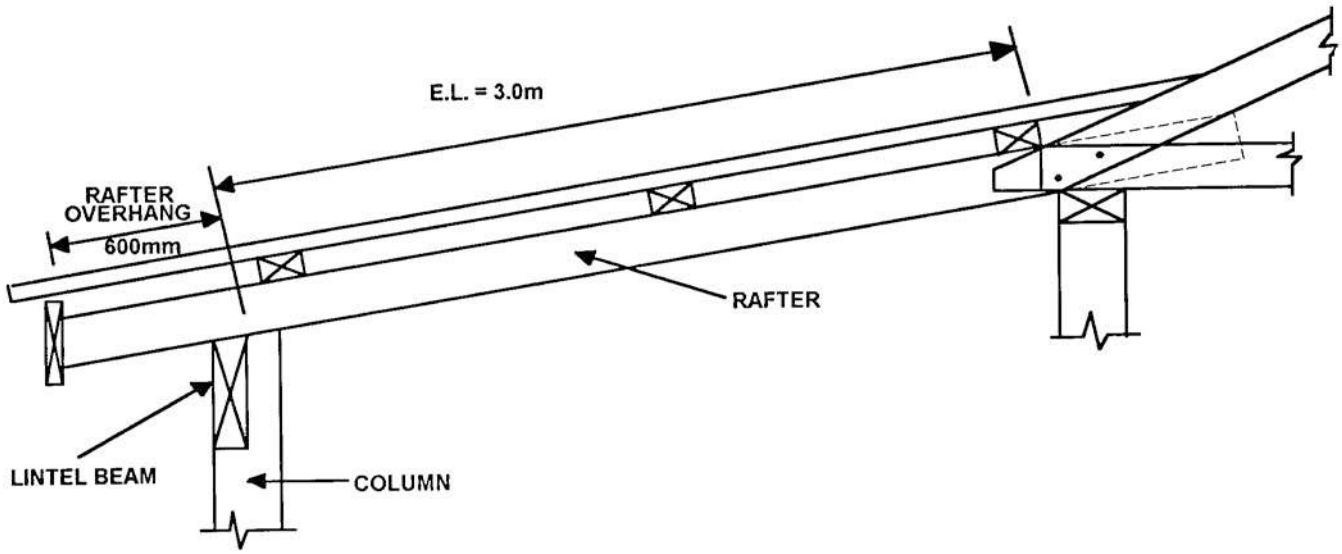
Necessary Information required to Select a Fascia or Verandah Beam Not Supporting the Main Roof, but incorporating a Window Wall and Doorway.



1.	Type of Timber	= **F5 Seasoned Softwood**
2.	Type of Roof	= **Sheet Roof with Ceiling**
3.	Effective Roof Length	= **E.L. 3.0m**
4.	Rafter Spacing	= **600mm**
5.	Beam Span	= **2.8m**
6.	Beam Size	= **170 × 45mm (From Table 9S)**

The overhang is included in the Table up to a maximum of 600mm. Any additional amount must be doubled and added to the value of the E.L. used to enter the Table in the supplement.

For Overhangs exceeding 1.0m special consideration must be given to Tie-Down and Anchorage.

SEASONED SOFTWOOD - STRESS GRADE F5

Table 9S LINTELS - Single or Upper Storey of Two Storey Construction

Size * Depth x Breadth (mm)	Rafter or Truss Spacing (mm)	Allowable Span of Lintel (m)							
		Sheet Roofing				Tiled Roofing			
		Effective Roof Length EL (m) - Fig. 4.1							
		3.0	6.0	9.0	12.0	3.0	6.0	9.0	12.0
170 x 45	600	**2.8**	2.4	2.0	1.7	2.2	1.8	1.5	1.3
	1200	2.8	2.0	1.6	1.3	1.9	1.3	1.0	0.8
170 x 70	600	3.1	2.7	2.4	2.1	2.5	2.1	1.8	1.6
	1200	3.1	2.6	2.3	2.0	2.4	2.0	1.5	1.1
190 x 35	600	2.9	2.4	2.0	1.7	2.2	1.7	1.5	1.3 ‡
	1200	2.8	2.0	1.6	1.3	1.8	1.3	1.0	0.7
190 x 45	600	3.0	2.6	2.2	1.9	2.4	2.0	1.6	1.4
	1200	3.0	2.5	2.0	1.6	2.3	1.6	1.2	0.9

* Size must not be under that stated (no negative tolerance)

(Extract from Timber Framing Code - AS 1684 - 1992)

Prepared by the
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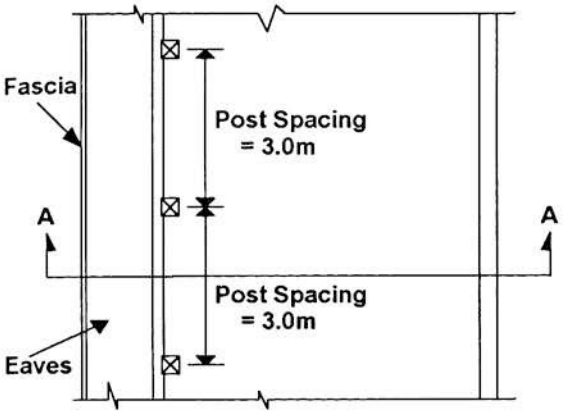
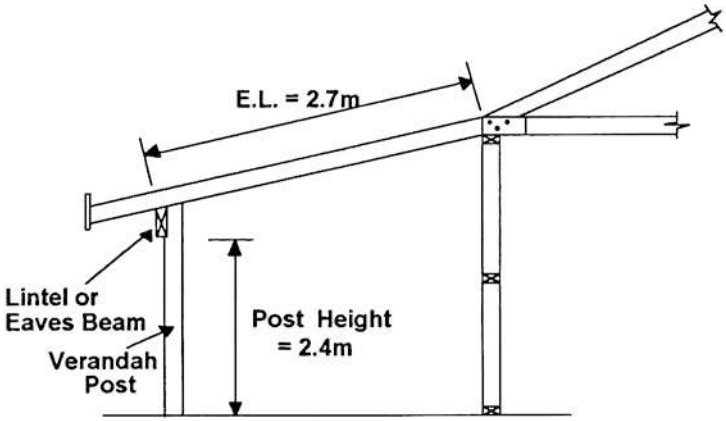
Necessary Information Required to Select Verandah Posts.

CLAUSE 4.6 (AS1684)

1. Type of Timber = **F 5 Seasoned Softwood**
2. Type of Roof = **Sheet**
3. Spacing between Posts = **3.0m**
4. Roof E.L. = **2.7m**
5. Post Size = **90mm x 90mm**
6. Post Height = **2.4m**
7. **Check Correct Table has been Used.**



PLAN



SECTION A - A

NOTE:
The E.L. includes 600mm of Eaves Overhang, for greater than 600mm refer to Rule 4.1.3.

SEASONED SOFTWOOD - STRESS GRADE F5

Table 18S VERANDAH POSTS

Post Size *	Post Height	Effective Roof Length E.L. (m) - Fig. 4.0							
		Sheet Roofing				Tiled Roofing			
		Spacing (m) between Posts							
(mm)	(m)	1.8	2.4	3.0	3.6	1.8	2.4	3.0	3.6
70 x 70	2.4	4.4	3.0	2.2	1.6	1.4	N S	N S	N S
	2.6	3.8	2.6	1.8	1.3	1.1	N S	N S	N S
	2.7	3.6	2.4	1.7	1.2	1.0	N S	N S	N S
	3.0	2.8	1.8	1.2	N S	N S	NS	N S	N S
90 x 90	2.4	12.0	9.2	**7.1**	5.7	5.3	3.7	2.7	2.1
	2.6	11.4	8.3	6.4	5.1	4.7	3.3	2.4	1.8
	2.7	10.9	7.9	6.0	4.8	4.5	3.0	2.2	1.6
	3.0	9.3	6.7	5.1	4.1	3.7	2.5	1.8	1.3

* Size must not be under that stated (no negative tolerance)

(Extract from Timber Framing Code - AS 1684 - 1992)

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Permanent Bracing of Stud Walls.

CLAUSE 4.9 (AS1684)

Wall Bracing requirements have been completely revised in the new Code. The superseded Code was never intended to cope with the open areas of modern housing - it was intended for very basic "Cottage" construction. The new Code is based on "Bracing Units"; Type A units have a racking resistance of 2 kN for each unit, and Type B units have a racking resistance of 4 kN for each unit.

There are five methods of achieving a Type A Bracing Unit, and two methods for Type B units, which allows a more flexible approach when designing a building. Type A and Type B Units may be used in conjunction to suit a building requirement.

The number of bracing units required is defined in relation to the area of the building facing the wind in both directions.

The method of obtaining the area is quite simple. For a single storey building, the area of the front or rear elevation is taken, following the shape of the roof line and deducting half the height of the walls, as explained in T F C Guide No. 068. This area is defined as Wind Direction 1.

When the area is known, Table 4.5 defines the number of Bracing Units required to be evenly distributed throughout the building with a minimum of two units in each of the external walls.

The same procedure is repeated for the side elevation which is defined as Wind Direction 2.

For two storey buildings, the upper storey requirements are the same as for single storey buildings. For the lower storey, the total area of the elevation is taken in both wind directions, with half the height of the lower storey walls subtracted, as explained in T F C Guide No. 069.

Table 4.5 gives required Wall Bracing Units in three wind speed areas; **28m/s, 33m/s** and **41m/s**, for both single and two storey buildings. The table also provides for two classifications of building; one table covers Hip Roofs from 6° to 35°, and the other covers Flat Wall, Parapets, Gables and Skillion Ends, and Roof Slopes up to 5°

This provides all the necessary information for a designer or builder regarding structures in almost every situation in Non-Cyclonic regions, such as South Australia.

There will be a change of terminology regarding Terrain Categories when classifying building sites. Terrain Categories have to be assessed in conjunction with other variables such as the Topographic Multiplier to define a Wind Speed.

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Permanent Bracing of Stud Walls. - *Continued*
CLAUSE 4.9 (AS1684)

Topographic classification for a building is the classification which determines the effect wind has on the building, because of it's location on a hill, ridge or escarpment, and the average steepest surface slope of that hill, ridge or escarpment.

In the past, the wind classification for building sites has been determined in accordance with the Wind Code AS 1170 - Part 2, by an engineer, or a person qualified to understand the requirements of the Wind Code.

The main purpose of AS 1170 - Part 2, was to provide information for industrial commercial and multi-storey buildings, and when applied to housing, the wind speeds obtained from the Code can be quite conservative. In fact, if all factors are assessed to "worst case" situations, the answer can be over-conservative and produce rather unrealistic wind speeds.

Standards Australia has released a special Wind Code for housing (AS 4055 - Wind Loads for Housing.)

This Code AS 4055, will complement the National Timber Framing Code AS 1684 - 1992, as it provides the necessary information to define the three variables which need to be assessed to arrive at a wind speed. The Designer or Builder can then refer to the Framing Code to obtain positive information for buildings in a range of wind speeds, ie. 28m/s, 33m/s and 41m/s. Any areas outside this range will need to be engineered.

AS 4055 has some limitations, but will provide information for the majority of housing. The limitations are; Maximum Height of a Building is 8.5m; Maximum Height of 6.0m to Eaves Line; and Maximum Height of each Storey at External Walls is 2.7m.

Terrain Category Classification is well defined in plain English, and there is quite a good follow through system of tables to define the Wind Speed of a particular site.

Items to consider when locating Bracing Units are :

1. **Position of Electrical Meter Box.**
2. **Plumbing in Wet Areas (Tap Outlets etc.)**
3. **Flush Wall Fittings (eg. Bathroom Cabinets)**
4. **Wall Frame adjacent to Bath.**
5. **Services in General (eg. Gas Heater Flues).**

SO MANY WELL PLANNED BRACING SYSTEMS BECOME DESTROYED BY OTHER TRADES.

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for **STANDARDS AUSTRALIA**

Design of Wall Bracing using AS 1684 - 1992.

The Tables produced within the Code have the following basis :-

1. As it is a Timber Framing Code, no allowance has been made for any contribution from brickwork.

2. An allowance has been made for the bracing which is provided by the plasterboard wall lining in normal domestic construction.

   Consideration was given to a number of standard house plans and it was considered that an amount of 40% for single storey and 20% for the lower storey of two storey buildings was a reasonable allowance for the contribution provided by the internal linings.

   This allowance has been built into the tables - however for large open areas which exceed the parameters of the Code, special consideration will be required using Engineering principles.

   It is considered the contribution provided by plasterboard linings fixed in accordance with the manufacturer's recommendations provides 0.5 kN/m for internal walls lined on both sides and 0.3 kN/m for single side linings, on external walls.

3. The ceiling diaphragm provides the distribution of forces throughout the building.

4. The Tables allow for the effect of horizontal wind loading on the projected elevation of buildings with roof pitches from 6° to 35°. The wind force on a pitched roof is less than on a vertical flat wall or gable end.

   Therefore it was necessary to provide separate tables for flat walls, gable end walls and skillion roofs up to 5° pitch, as well as roof pitches from 6° to 35°.

   When a roof pitch exceeds 35°, the same method to define the surface area for roof pitches 6° to 35° can be used, but the number of bracing units must be selected from the Table for flat walls, gable ends and roof slopes up to 5°.

   The above mentioned method will be conservative, the alternative is to design the wall bracing system in accordance with Engineering principles.

5. The number of Bracing Units defined in Table 4.5, are based on a maximum upper and lower storey wall height of 2700mm. For wall heights of 3000mm, the number of bracing units determined in Table 4.5 shall be increased by 15%.

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