

ARCHITECTURAL PROFILES LIMITED UNDER PURLIN CALCULATIONS

28/Oct/97

6:15 PM

Description: Pomare Residence
Aitken Joinery

Span (mm) = 4200

Spacings = 725 mm & 725 mm

Glazing = 6 mm thickness = 0.14 kPa

Material = Steel $E = 200 \text{ GN/m}^2$ $F_y = 350 \text{ MPa}$

Wind Zone = High $q_{ULS} = 1.20 \text{ kPa}$ $q_{SLS} = 0.46 \text{ kPa}$

Under Purlin Under Purlin Span = 4350 mm

Pitch = 25 ° N° of Roof Bars 5

Snow Load = 0.50 kPa Under Purlin Weight = 2.00 kg/m

Point Load = 0.40 kN

Member Weight = 2.00 kg/m

Strength (Z required) = $Z_{eff_{out}} = 2.50E+04 \text{ mm}^3$

$Z_{eff_{in}} = 2.50E+04 \text{ mm}^3$

Servicability (I_{xx} required) = $3.32E+06 \text{ mm}^4$

0

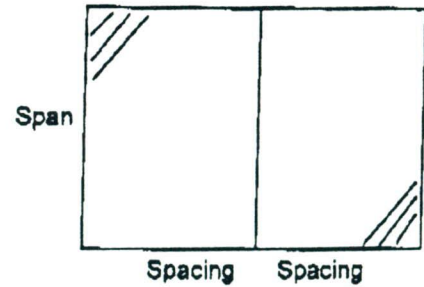
125x75x5 STEEL RHS

$$I_{xx} = 3.64 \times 10^6 \text{ mm}^4$$

$$Z_x = 5.83 \times 10^4 \text{ mm}^3$$

BEAM DETAIL FOR RIDGE SPAN.

The provisions of the Southland District Council Bylaws override anything that is inconsistent in this Specification, and must be complied with.



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1 September 1997

VANTAGE CONSERVATORY DESIGN MANUAL 1997

This letter serves to confirm that Stiles and Hooker Limited have undertaken design calculations relating to the aluminium profile sizes and the connection details of various conservatory configurations shown in the above design detail manual initialled and dated 1/9/97 by Stiles and Hooker Ltd. Diaphragm stability of individual wall panels which provide the lateral strength to the conservatories has been verified by Architectural Profiles Ltd who have undertaken physical load tests on a variety of panels as a separate exercise from the work done by Stiles and Hooker Ltd.

The conservatories have been designed to support wind loads equivalent to NZS 3604:1990 wind categories Low(L), Medium(M), High(H) and Very High(H) as derived from NZS 4211:1985 appendix A. Gravity load performance is based upon NZS 4203:1992 provisions. The design of the aluminium members is based upon AS 1664:1979 "SAA Aluminium Structures Code".

Floor/foundations to conservatories are to be equal or better to NZS 3604 requirements.

Conservatories falling outside the tabulated spans, load conditions and general configuration must be the subject of a specific structural design and certification.

I W BROWN
STILES & HOOKER LTD

The provisions of the Southland District Council Bylaws require anything that is inconsistent in this Specification, and must be complied with.

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ISO 9001

New Zealand Standard NZS 3604:1990

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2.6.2

The wind zone (low, medium, high or very high) for each specific building site shall be determined from table 2.4 by consideration of the wind region, the ground roughness and topography surrounding the proposed site, and the exposure of proposed building on the site.

C2.6.2

Wind flow over New Zealand is fundamentally that of ocean winds which are modified by land formations as it passes across the country. The wind speed (and resulting pressure) is increased as it passes over and between hills, or through valleys, and slightly reduced by the increased drag caused by rough ground. The shapes of the hills and valleys (topography), and the ground roughness (drag) adjacent to the site, influence the site wind speed. The exposure of the building further influences the wind speed on the actual building itself. Table 2.3 identifies the wind regions and has been prepared by considering the modified wind speed as outlined in NZS 4203, for buildings with an eaves height of 8m above adjacent ground.

2.6.3

Wind regions shall be as given in table 2.3, or as indicated from fig. 2.3 for locations not listed in the table.

C2.6.3

The wind regions are based on wind speed data supplied by the New Zealand Meteorological Service and included in NZS 4203. It is based on wind speeds which have a 5% probability of exceedance in 50 years.

2.6.4

The ground roughness (urban, rural, open) of a site is determined by considering the

number and height of obstructions over which the wind must pass as it approaches that site. At least 500m of rougher ground is required to affect the wind profile. Sites within this 500m wide fringe zone shall be considered as if they are in the less rough terrain. Ground roughness shall be based upon the likely terrain five years hence.

C2.6.4

The ground roughness classification indicates the drag effect on the wind profile as it passes over different terrains.

Urban terrain is typical of most New Zealand residential subdivisions. It is defined as that where the density of obstructions (houses or trees) is not less than 10 per hectare and coincides with Terrain Category 3 of NZS 4203:Part 4.

Rural terrain is typical New Zealand farmland, with some trees and shelter belts, cropping and horticulture. Tussock land is also in the category. This coincides with Terrain Category 2.5 of NZS 4203:Part 4.

Open terrain includes grazed pasture, areas adjacent to beaches and the sea, airfields and other areas of isolated trees or shelter only. This coincides with Terrain Category 2 of NZS 4203: Part4.

2.6.5

The site exposure shall be determined by consideration of the shielding effects of obstructions to wind flow. At least two rows of similarly sized, permanent obstructions in each upwind direction are required for the site to be considered as 'sheltered'. The assessment may be based upon the expected conditions five years hence (see fig. 2.4).

C2.6.5

Typical New Zealand suburban developments

New Zealand Standard NZS 3604:1990



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on flat or gently undulating ground, will usually be 'sheltered' unless they are adjacent to playing fields or other open spaces, beach fronts, large rivers, motorways, or wind channels greater than 100m in width, in which case to two outer rows of buildings will usually be considered to be 'exposed'. In urban terrain, shielding multipliers of 0.8 and 0.9 have been applied to such sheltered sites and 'exposed' sites respectively, and 0.9 and 1.0 for both rural and open terrain.

Most houses located on moderate or steep hillside sites should be considered as 'exposed'.

2.6.6

The topographic classification (T1, T2, T3, T4 and T5) for each site to account for the acceleration of the wind flow over hills, through channels and as a result of wind flow over mountains. The type of landform (escarpment or hill/ridge/spur) and the 'smoothed gradient' are used to establish the character of the formation (steep, moderate, or gentle), and table 2.5 used to determine the topographic classification of the proposed site by considering the horizontal distance of the site from the crest. Undulations of less than 25m in height and gradients less than 1:10 may be ignored. The 'smoothed gradient' is the change of elevation from the crest to a point three times the height from the crest in the upwind direction.

C2.6.6

For sites on spurs, an assessment of the gradient of the spur will be required by considering the spur as part of the main hill range (i.e. wind flow across the main hill range along the spine of the spur) where the height and slope relate to the hill range; and also across the section of the spur where the height and slope relate to the spur itself.

2.7

Building permit applications

2.7.1

Together with every application for a building consent in accordance with the Building Act 1991 for a building purporting to comply with this Standard shall be included;

- (a) A floor plan of each floor level;
- (b) An elevation of each external wall;
- (c) The type and location of each foundation element (for example; reinforced masonry foundation wall, anchor pile, cantilevered pile, and so on);
- (d) Adequate information on all subfloor, floor, wall, and roof framing, including the type and location of each subfloor brace, diagonal brace, and wall bracing element and the number of bracing units assigned to each wall bracing element;
- (e) The type and location of cladding, sheathing, and lining.

New Zealand Standard NZS 3604:1990



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Table 2.2
WIND ZONES FLOW CHART

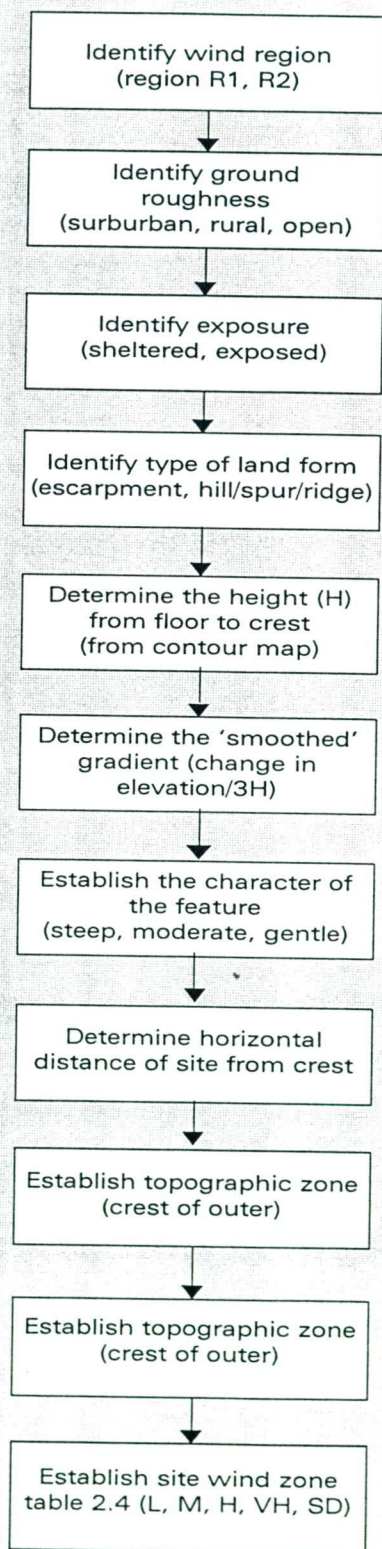


Table 2.3
EARTHQUAKE ZONE AND WIND
REGIONS FOR VARIOUS LOCALITIES

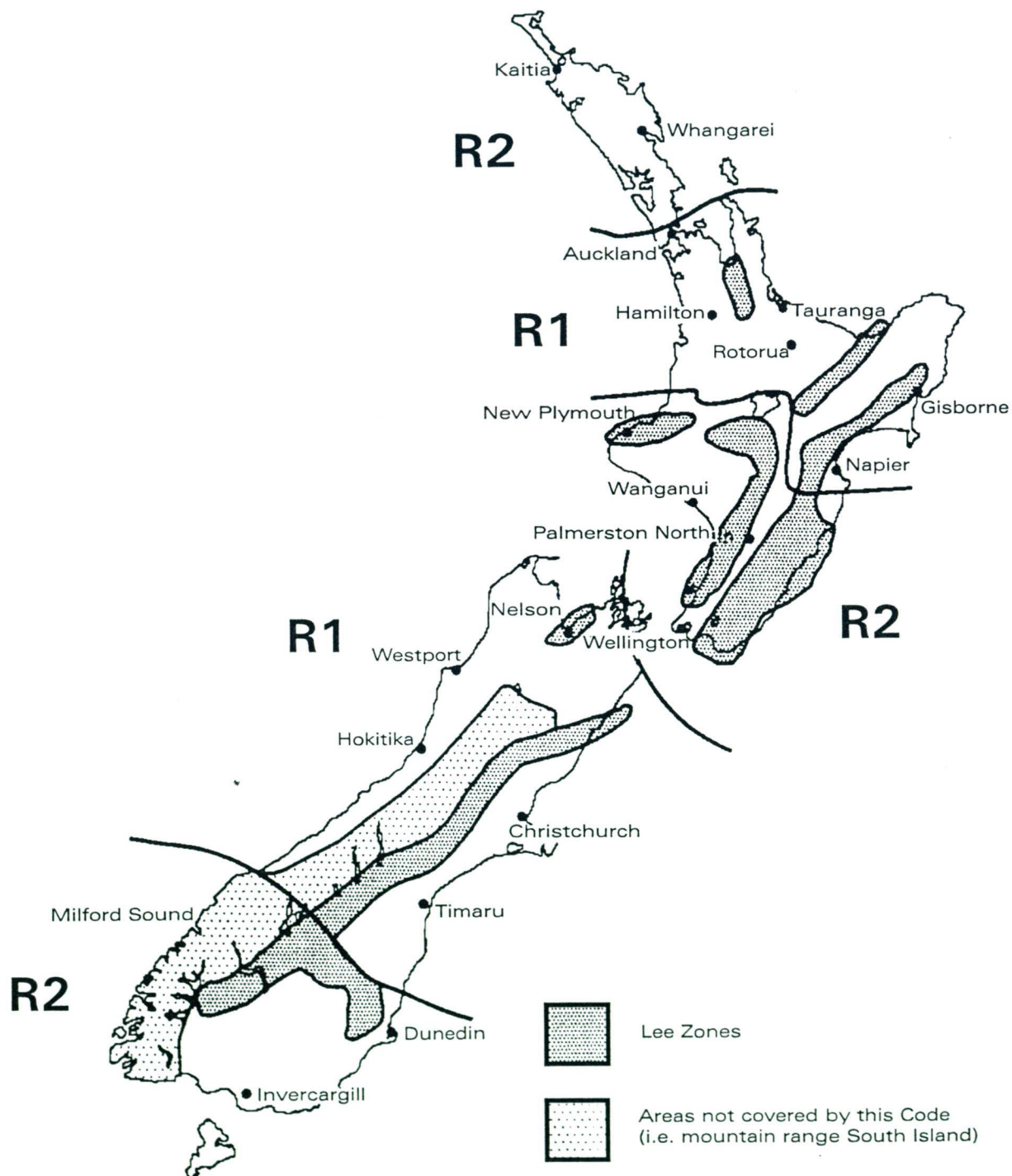
Locality	Wind Region
North Island	
Kaitia	R2
Whangarei	R2
Dargaville	R2
Kaiwaka	R2
Helensville	R2
Auckland	R1
Albany	R1
East Coast Bays	R1
North Shore	R1
Howick	R1
Clevedon	R1
Thames	R1
Paeroa	R1
Coromandel	R1
Whitianga	R1
Tairua	R1
Hamilton	R1
Waihi	R1
Tauranga	R1
Rotorua	R1
Taumarunui	R2
Taupo	R2
Gisborne	R2
Napier	R2
Hastings	R2
Waipukurau	R2
New Plymouth	R2
Wanganui	R2
Marton	R2
Palmerston North	R2
Dannevirke	R2
Wellington	R2
South Island	
Nelson	R1
Blenheim	R1
Amberley	R1
Christchurch	R1
Port Hills	R1
Banks Peninsula	R1
Lyttleton	R1
Timaru	R1
Oamaru	R1
Westport	R1
Hokitika	R1
Dunedin	R2
Gore	R2
Winton	R2
Invercargill	R2
Alexandra	R2

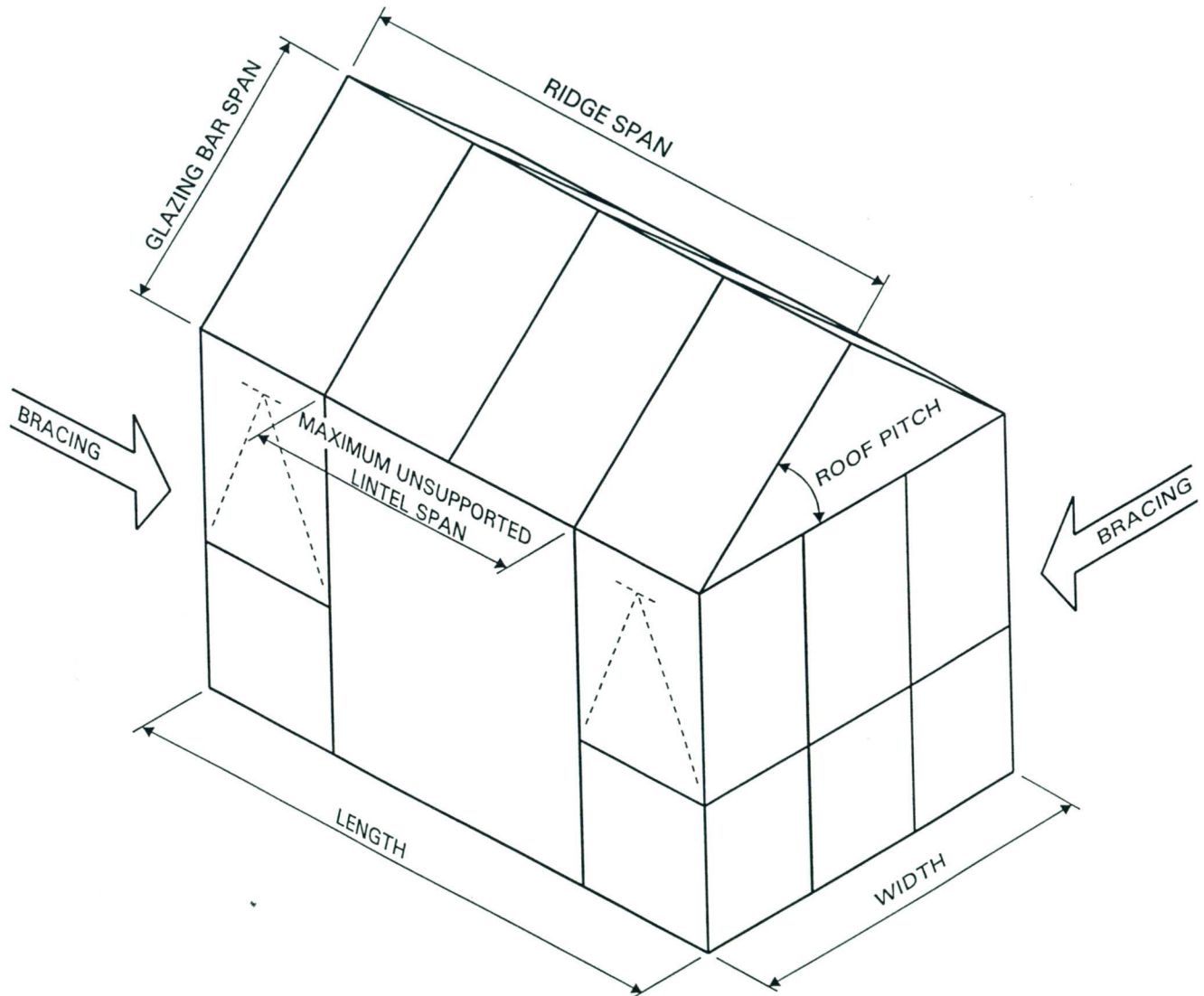
New Zealand Standard NZS 3604:1990



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Fig. 2.3
Wind Regions

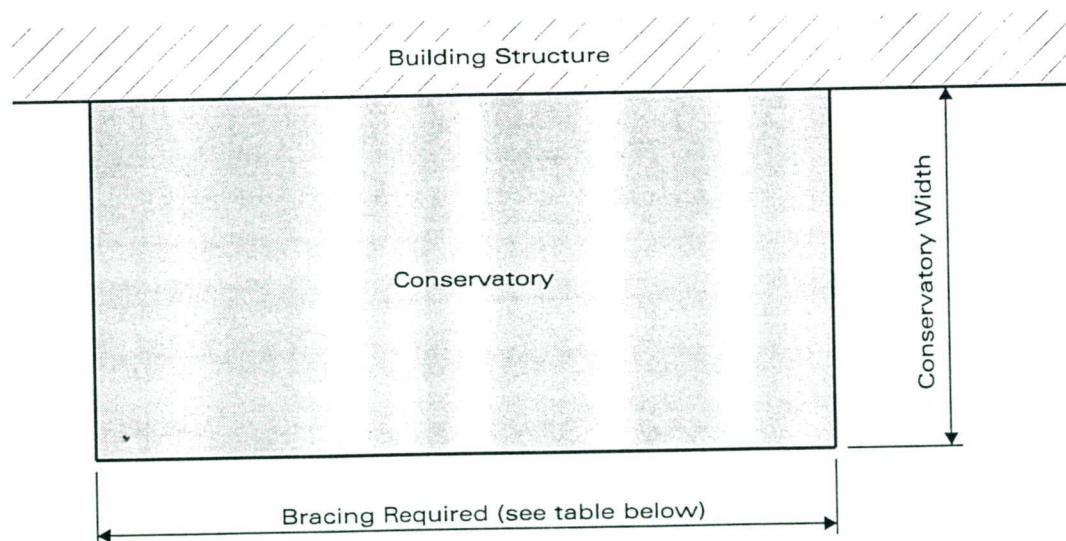
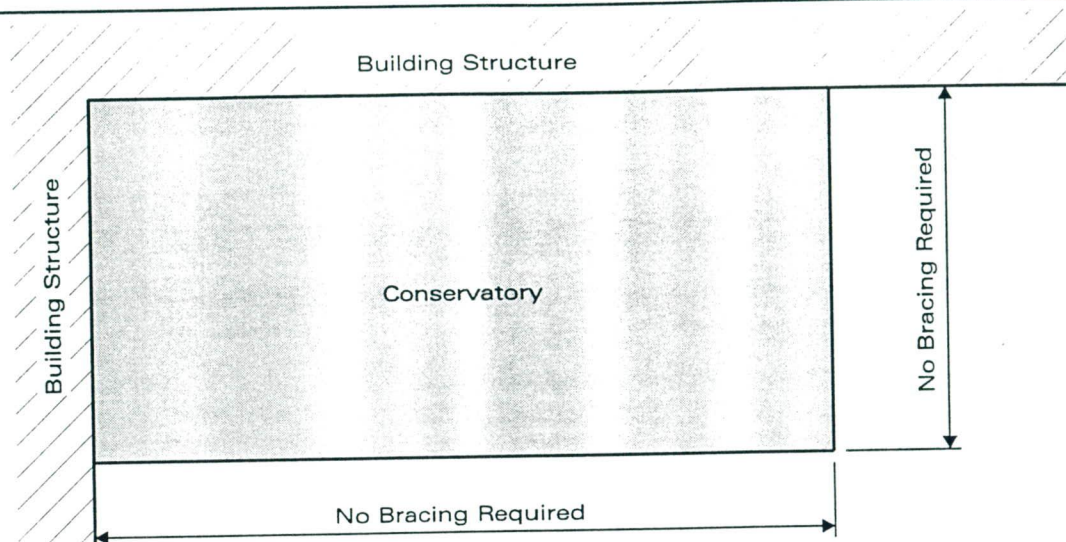




The following tables have been calculated with the following assumptions:

- Roof pitch is flat, 0°.
- Glazing bar centres (when no choice is given) are at 500mm centre to centre.
- Glazing is to be held into place with a backing rubber and wedge. pressure fit beads are not permitted in bracing elements
- Architectural Profiles Limited will provide a specific design service for conservatories which are outside the scope of this manual.

Bracing Selection Tables



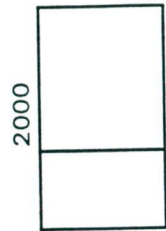
Bracing Units

WIND ZONE	Conservatory Width (mm)										
	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
Low	7	10	13	17	14	23	26	30	34	37	40
Medium	9	13	18	22	27	31	35	40	45	49	54
High	13	19	25	32	38	44	51	57	63	70	76
Very High	16	25	33	41	49	58	66	74	82	91	99

Bracing Selection Configurations



800 - 1000



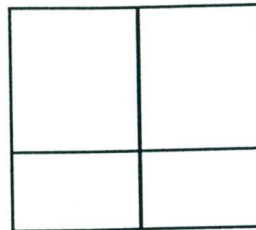
BU = 10

800 - 1000



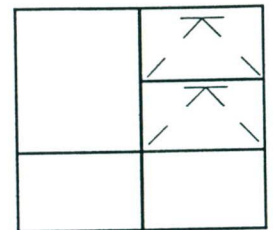
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1600 - 2000



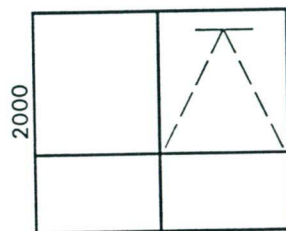
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1600 - 2000



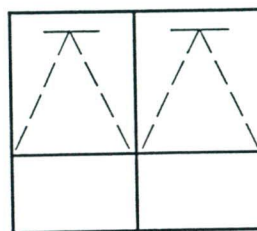
BU = 32

1600 - 2000



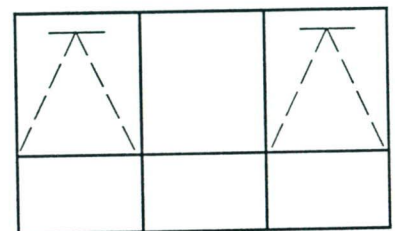
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1600 - 2000



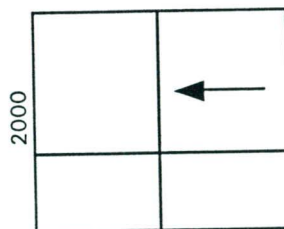
BU = 0

2400 - 3500



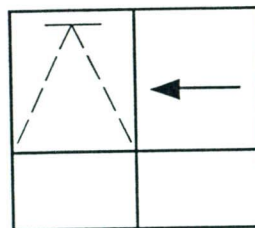
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1800 - 2400



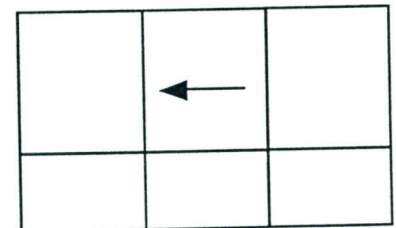
BU = 10

1800 - 2400



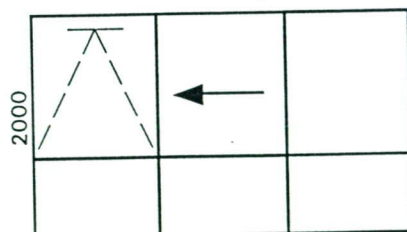
BU = 10

2600 - 3600



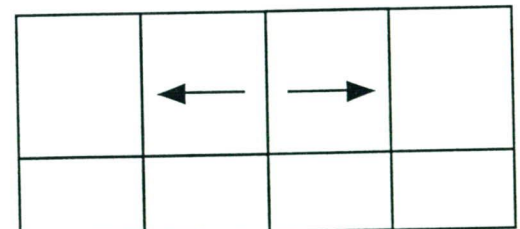
BU = 30

2600 - 3600



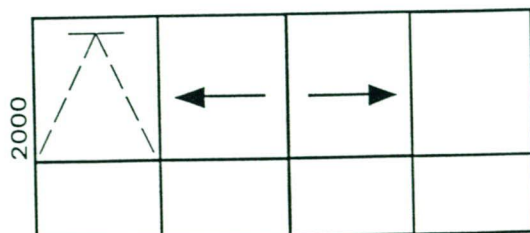
BU = 30

3600 - 4800



BU = 36

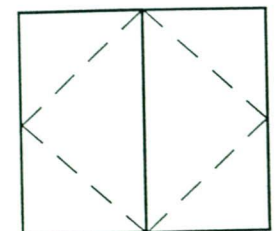
3600 - 4800



BU = 36



BU = 0



BU = 0



Overhead Glass Selection 2 Sided Edge Support



The following tables have been calculated from NZS 4223:1985 using the following Design loads on glass:

$$\text{Design Pressure} = + 2.6(P_d + P_s) + P_w$$

Where: P_d = Aluminium Bars & Glass $< 30^\circ = 180\text{Pa}$

P_s = Snow Load = 500Pa or 1000Pa

P_w = Wind Load = Max 3m height & Ground roughness of 1 from Table 20

These tables are to be used as a guide only, if in doubt of selection or if calculation of 4 sided edge support is required contact your local glass supplier for an accurate glass size for your conservatory.

Wind Zone	Wind Speed	DESIGN PRESSURE		
		No Snow	0.5kPa Snow	1.0kPa Snow
Low	32m/s	827Pa	2127Pa	3427Pa
Medium	37m/s	956Pa	2256Pa	3556Pa
High	44m/s	1106Pa	2406Pa	3706Pa
Very High	50m/s	1274Pa	2574Pa	3874Pa

Note: IGU's can be made up from combinations of the glazing tables below. If using annealed glass use laminate glass table

LOW

TOUGHENED GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	4mm	5mm	6mm
700	4mm	6mm	8mm
800	5mm	6mm	8mm
900	5mm	8mm	10mm
1000	5mm	8mm	10mm

LAMINATE GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	6.38mm	8.38mm	10.38mm
700	6.38mm	8.38mm	10.38mm
800	6.38mm	10.38mm	12.38mm
900	8.38mm	10.38mm	NA
1000	8.38mm	12.38mm	NA

MEDIUM

TOUGHENED GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	4mm	5mm	6mm
700	5mm	6mm	8mm
800	5mm	6mm	8mm
900	5mm	8mm	10mm
1000	6mm	8mm	10mm

LAMINATE GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	6.38mm	8.38mm	10.38mm
700	6.38mm	8.38mm	10.38mm
800	8.38mm	10.38mm	12.38mm
900	8.38mm	12.38mm	NA
1000	8.38mm	12.38mm	NA

HIGH

TOUGHENED GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	4mm	5mm	6mm
700	5mm	6mm	8mm
800	5mm	6mm	8mm
900	6mm	8mm	10mm
1000	6mm	8mm	10mm

LAMINATE GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	6.38mm	8.38mm	10.38mm
700	6.38mm	10.38mm	12.38mm
800	8.38mm	10.38mm	12.38mm
900	8.38mm	12.38mm	NA
1000	8.38mm	12.38mm	NA

VERY HIGH

TOUGHENED GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	4mm	5mm	6mm
700	5mm	6mm	8mm
800	5mm	8mm	8mm
900	6mm	8mm	10mm
1000	6mm	8mm	10mm

LAMINATE GLASS			
Bar Centres	No Snow	0.5kPa Snow	1.0kPa Snow
600	6.38mm	8.38mm	10.38mm
700	8.38mm	10.38mm	12.38mm
800	8.38mm	10.38mm	12.38mm
900	8.38mm	12.38mm	NA
1000	10.38mm	12.38mm	NA

Glazing Bar Spans - Double Glazed



Note: Tables are calculated on basis of 0° pitch roof (i.e. flat) being worst case scenario. For a more accurate span at a given pitch contact APL technical department

0744	BAR CENTRES	No Snow Load				0.5 kPa Snow Load				1.0 kPa Snow Load			
		L	M	H	VH	L	M	H	VH	L	M	H	VH
	600	2.81	2.81	2.63	2.38	2.61	2.61	2.56	2.32	2.23	2.23	2.23	2.23
	700	2.12	2.12	1.87	1.65	2.03	2.03	1.77	1.62	1.74	1.74	1.71	1.59
	800	2.08	1.93	1.72	1.57	1.90	1.87	1.68	1.54	1.65	1.65	1.64	1.51
	900	1.95	1.84	1.65	1.51	1.83	1.73	1.57	1.45	1.62	1.62	1.61	1.48
	1000	1.91	1.77	1.59	1.44	1.73	1.67	1.52	1.41	1.57	1.57	1.56	1.44

0601		L	M	H	VH	L	M	H	VH	L	M	H	VH
	600	2.42	2.42	2.39	2.39	2.33	2.33	2.33	2.11	1.98	1.98	1.98	1.98
	700	2.37	2.37	2.23	2.01	2.23	2.23	2.13	1.94	1.89	1.89	1.86	1.86
	800	2.33	2.33	2.05	1.86	2.08	2.08	2.01	1.83	1.78	1.78	1.78	1.78
	900	2.19	2.19	1.96	1.78	2.01	2.01	1.87	1.72	1.75	1.75	1.75	1.75
	1000	2.15	2.12	1.88	1.69	1.95	1.89	1.80	1.66	1.70	1.70	1.70	1.69

9616		L	M	H	VH	L	M	H	VH	L	M	H	VH
	600	2.81	2.81	2.63	2.38	2.61	2.61	2.56	2.32	2.23	2.23	2.23	2.23
	700	2.74	2.74	2.45	2.17	2.49	2.49	2.32	2.12	2.12	2.12	2.08	2.08
	800	2.68	2.53	2.25	2.04	2.32	2.32	2.19	2.00	2.00	2.00	2.00	1.96
	900	2.48	2.40	2.14	1.95	2.24	2.17	2.03	1.87	1.97	1.97	1.97	1.91
	1000	2.43	2.30	2.05	1.84	2.10	2.10	1.95	1.80	1.91	1.91	1.91	1.84

0597		L	M	H	VH	L	M	H	VH	L	M	H	VH
	600	3.38	3.70	3.24	2.92	3.39	3.39	3.16	2.86	2.86	2.86	2.86	2.81
	700	3.33	3.27	2.87	2.58	2.91	2.91	2.74	2.49	2.46	2.46	2.42	2.42
	800	3.57	3.24	2.77	2.51	3.01	3.01	2.71	2.46	2.57	2.57	2.57	2.41
	900	3.26	2.98	2.63	2.38	2.90	2.89	2.51	2.29	2.52	2.52	2.52	2.34
	1000	3.11	2.84	2.51	2.24	2.81	2.68	2.40	2.20	2.44	2.44	2.44	2.24

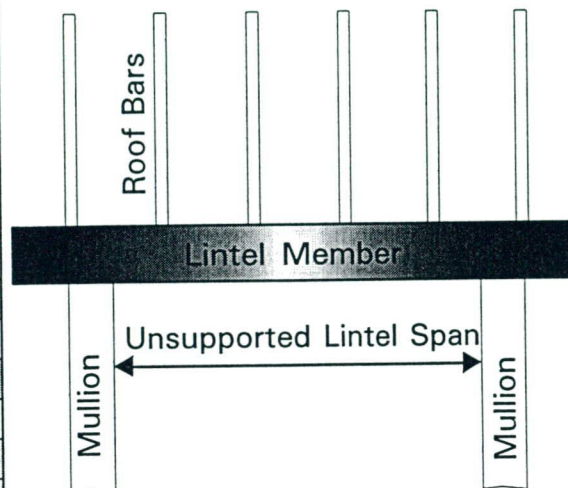
Unsupported Lintel Spans

Single Glazed



Lintel Members

I.D	Height mm	Width mm	Wall mm	Material	Section N°
A	60	60	1.4	Aluminium	0912
B	45	75	2	Aluminium	7771
C	50	50	3	Aluminium	5917
D	35	65	2	Steel	
E	45	100	3	Aluminium	9436
F	75	45	2	Aluminium	7771
G	50	50	3	Steel	
H	100	50	2	Aluminium	0845
I	65	65	2	Steel	
J	100	45	3	Aluminium	9436
K	75	50	2.5	Steel	
L	75	75	2.5	Steel	
M	100	50	2	Steel	
N	100	45	3+Bar	Aluminium	9436/9699
O	100	50	3	Steel	
P	150	50	3	Aluminium	0863



Top rolled bifold doors have not been allowed for in calculations

Lintel Spans

Roof Bar Spans

	1000	1500	2000	2500	3000	3500	4000	4500	5000
No Snow									
1200	A	A	A	A	A	A	A	A	A
1800	A	A	A	E	E	E	F	G	G
2400	E	F	G	H	H	I	J	K	K
3000	G	H	I	K	L	L	M	M	N
3600	I	K	L	M	N	O	-	-	-

0.5kPa Snow									
1200	A	A	A	A	A	A	A	A	A
1800	A	A	A	E	E	F	F	G	G
2400	E	F	G	H	H	I	J	K	K
3000	G	H	I	K	L	L	M	M	N
3600	I	K	L	M	N	O	-	-	-

1.0kPa Snow									
1200	A	A	A	A	A	A	A	C	D
1800	A	C	E	F	F	G	G	H	H
2400	F	G	H	I	J	K	L	L	L
3000	H	J	K	L	M	N	N	O	-
3600	K	L	N	O	-	-	-	-	-

Ridge Spans Double Glazed



Ridge Spans		Roof Bar Spans									
		1000	1500	2000	2500	3000	3500	4000	4500	5000	
Low	1000	A F	A F	A F	A F	A F	A F	A F	A F	A F	
	1500	A F	A F	A F	A F	B F	B F	B F	B F	B F	
	2000	A F	B F	B F	B F	C F	C G	C G	D G	D G	
	2500	B F	C F	C G	D G	D G	E H	E H	X I	X I	
	3000	C G	D G	E H	E I	X I	X J	X J			
	3500	D G	E H	X I	X J						
	4000	E I	X J								
	4500	X J									
5000											
Medium	1000	A F	A F	A F	A F	A F	A F	A F	A F	A F	
	1500	A F	A F	A F	A F	B F	B F	B F	B F	B F	
	2000	A F	B F	B F	B F	C F	C G	C G	D G	D G	
	2500	B F	C F	C G	D G	D G	E H	E H	X I	X I	
	3000	C G	D G	E H	E I	X I	X J	X J			
	3500	D G	E H	X I	X J						
	4000	E I	X J								
	4500	X J									
5000											
High	1000	A F	A F	A F	A F	A F	A F	A F	A F	A F	
	1500	A F	A F	A F	A F	B F	B F	B F	B F	B F	
	2000	A F	B F	B F	B F	C F	C G	C G	D G	D G	
	2500	B F	C F	C G	D G	D G	E H	E H	X I	X I	
	3000	C G	D G	E H	E I	X I	X J	X J			
	3500	D G	E H	X I	X J						
	4000	E I	X J								
	4500	X J									
5000											
Very High	1000	A F	A F	A F	A F	A F	A F	A F	A F	A F	
	1500	A F	A F	A F	B F	B F	B F	B F	B F	B F	
	2000	B F	B F	B F	C F	C G	C G	D G	D G	E H	
	2500	B F	C G	C G	D G	E H	E H	X I	X I	X J	
	3000	C G	D H	E H	X I	X J					
	3500	E H	X I	X J							
	4000	X I									
	4500	X J									
5000											

KEY

Standard Vantage Roof

A = 0553

B = 0553 & 32x32 box

C = 0553 & 45x45 box

D = 0553 & 50x50 box

E = 0553 & 75x45 box

X = Use standard 40mm roof or attached apex calculation sheet.

Standard 40mm Roof

F = 0600

G = 0600 & 32x32 box (5728)

H = 0600 & 45x45 box (1468)

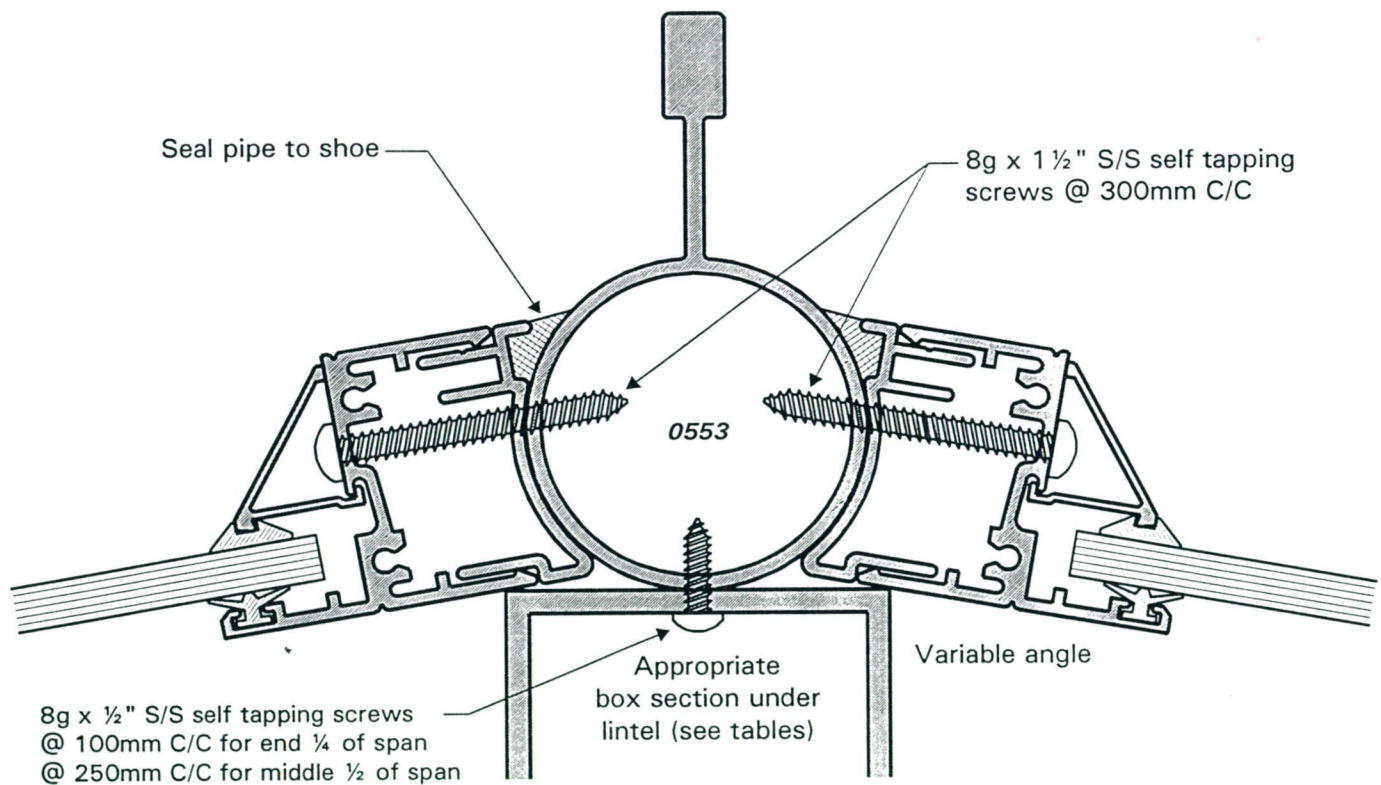
I = 0600 & 50x50 box (5917)

J = 0600 & 75x45 box (7771)

Conservatory Detail 1 Standard Ridge / Hip



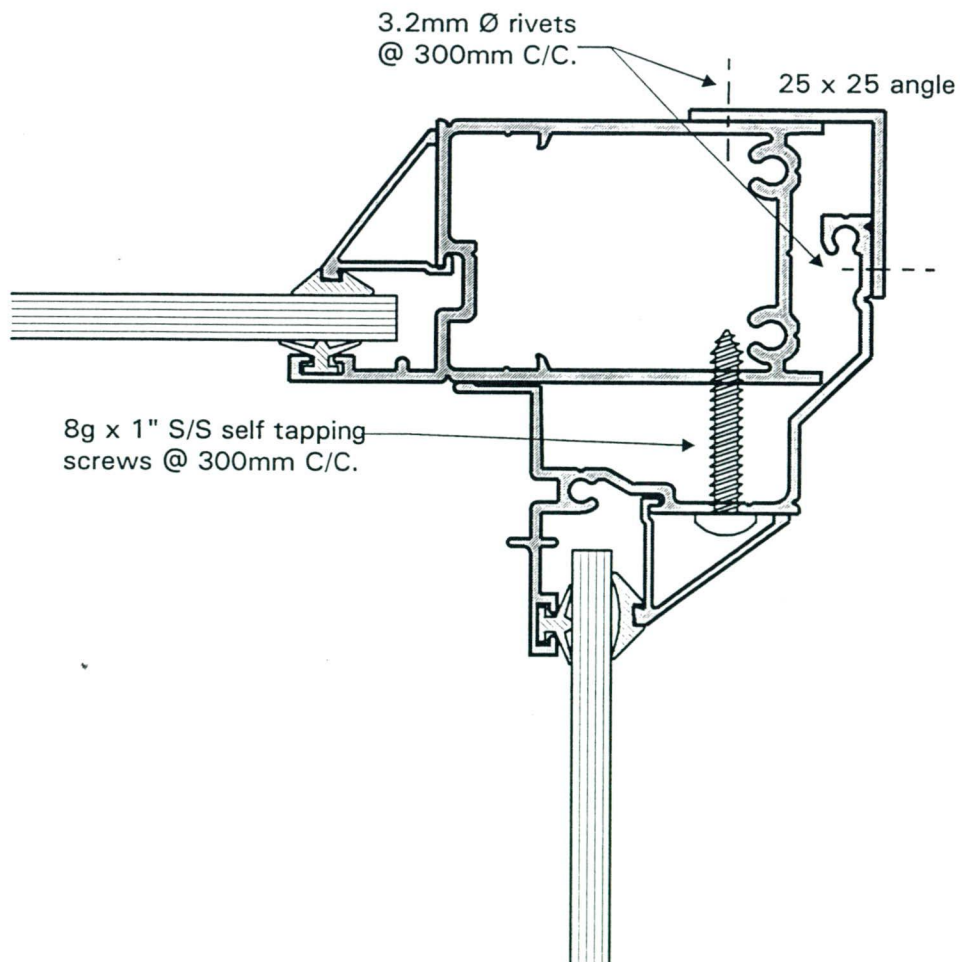
Scale: 1:1



● Conservatory Detail 5 Standard Gable Connection



Scale: 1:1

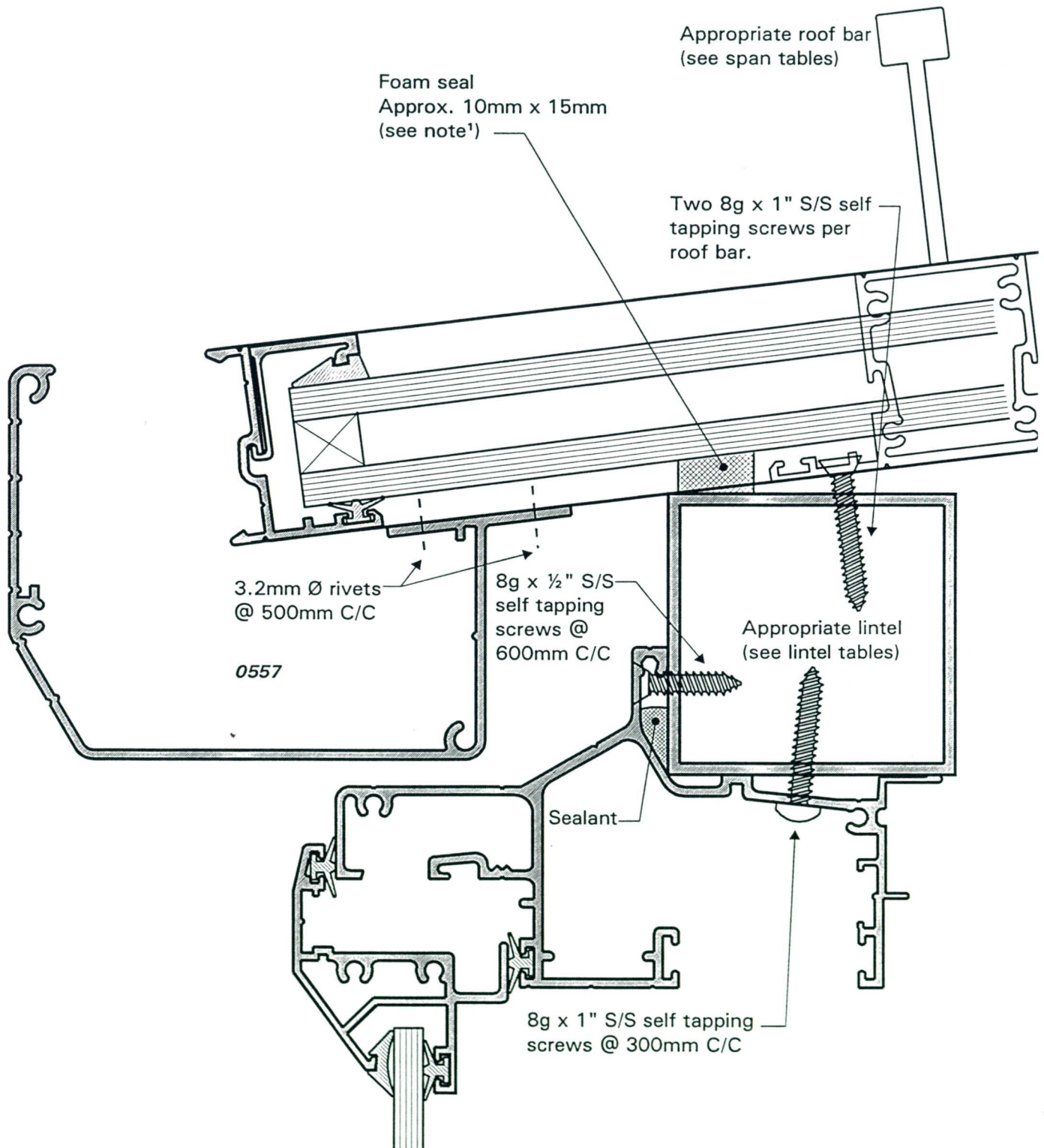


Conservatory Detail 6

Standard Lintel Connection

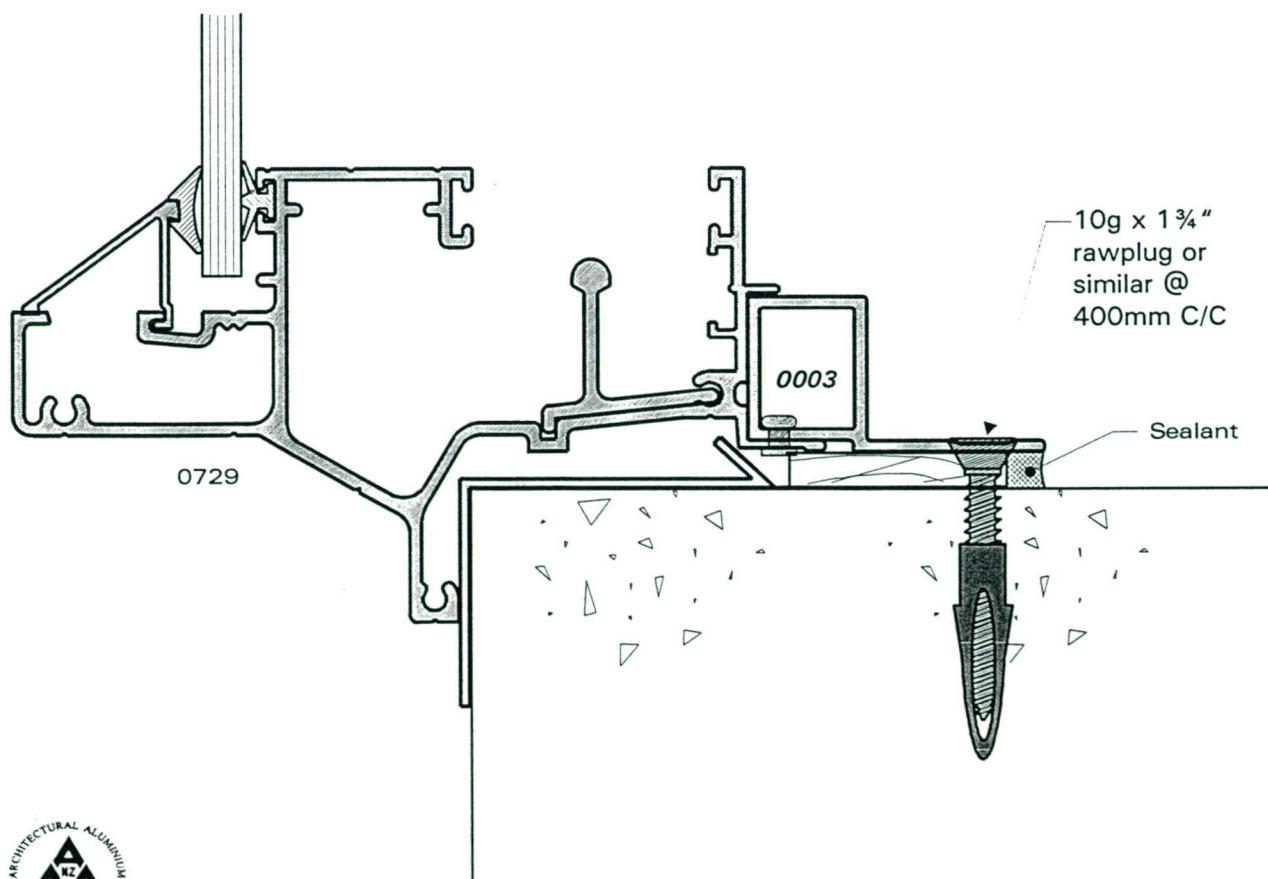
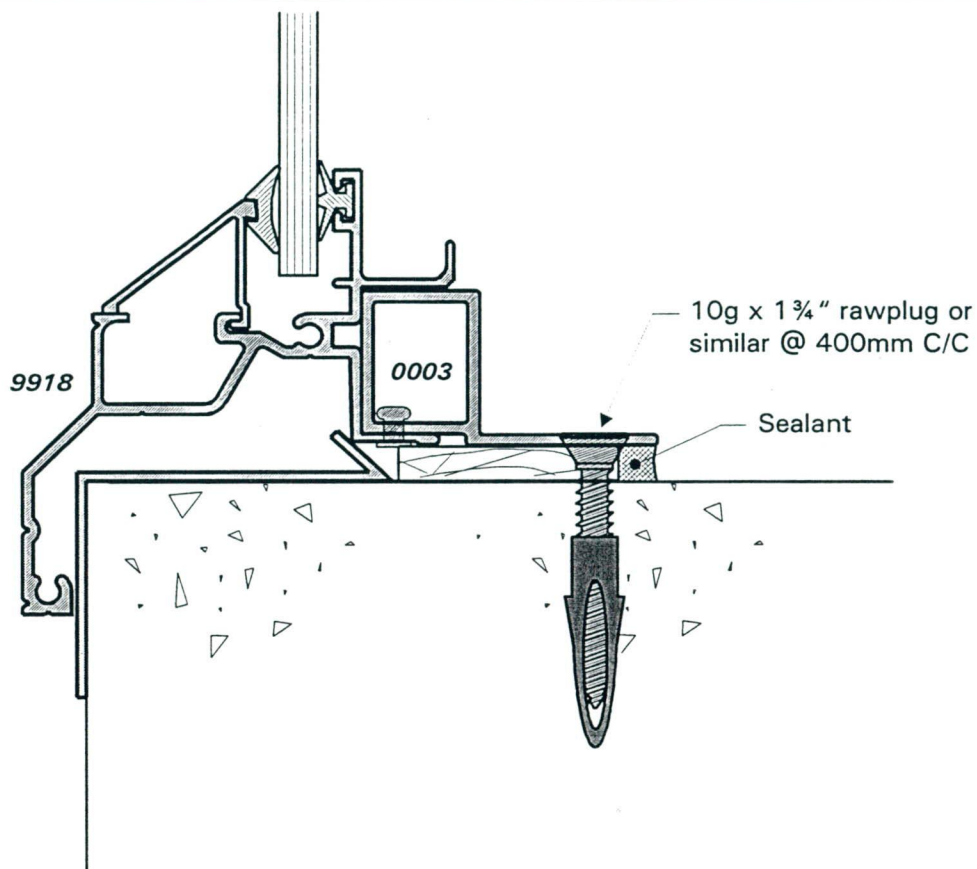
Double Glazed Option

Scale: 1:1



Conservatory Detail 7 Sill Fixing into Concrete Floor

Scale: 1:1



● Conservatory Detail 9 90° Corner Post

Scale: 1:1

