



e-form 
engineered formwork

e-form
engineered
LVL concrete
formwork
beams

e-form beams are purpose-designed for the high load-bearing and corrosive environment of the concrete formwork industry. The use of slow-growing, high density Maritime Pine makes e-form the highest load-bearing formwork LVL beam available in Australia. A high wax loading in the moisture-repellent coating improves the dimensional stability of e-form, extending its life and cost effectiveness.

- Features**
- Highest strength, yet light to handle.
 - High wax content moisture repellent protective coating for improved dimensional stability.
 - Engineered straightness and consistent performance.
 - Manufactured in lengths up to 12m, minimising wastage.
 - Chamfered edges for comfortable handling.
 - Manufactured from 100% plantation pine.



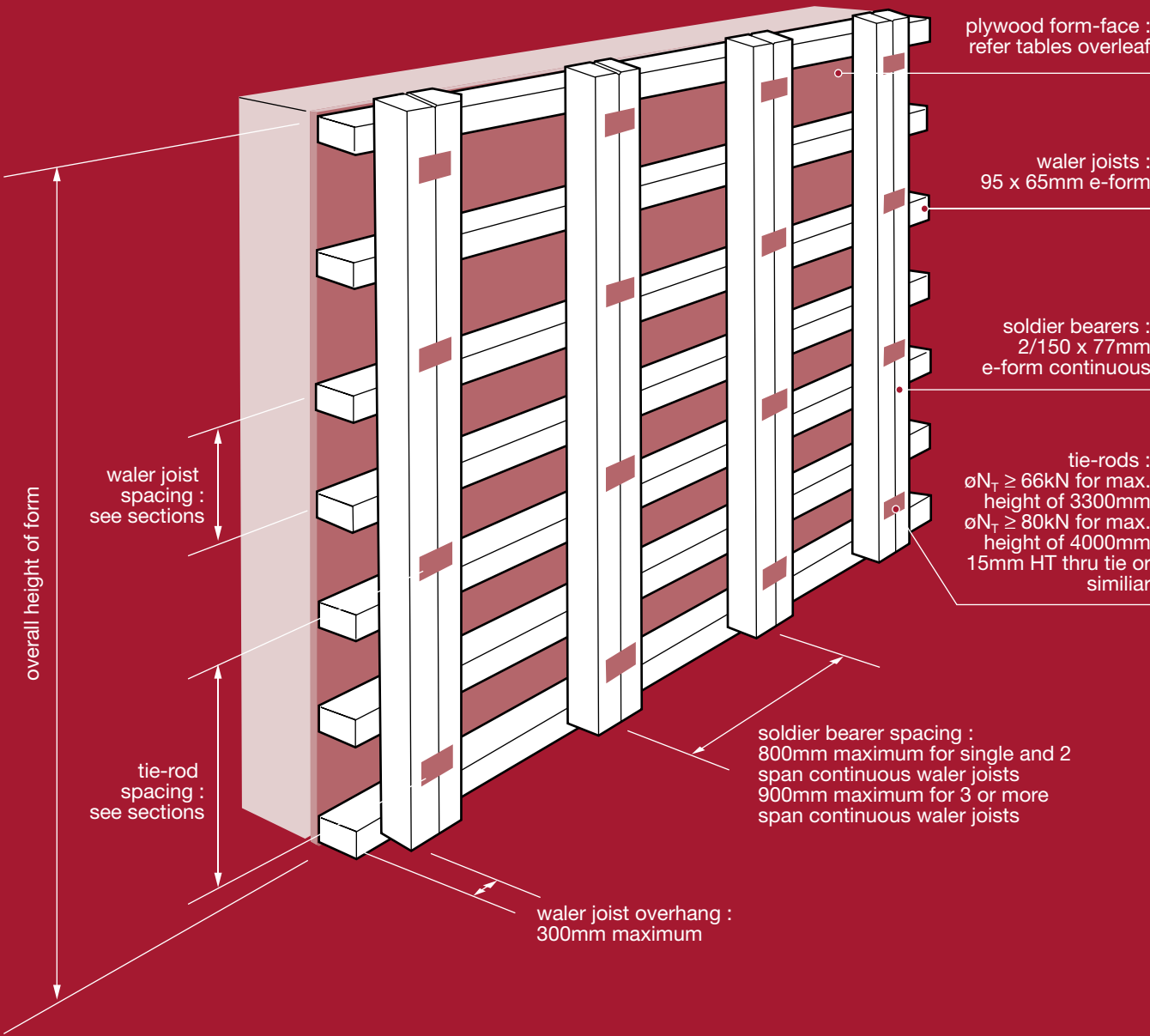
Quality

- Manufactured in a quality controlled manufacturing environment in accordance with AS/NZS 4357 – Structural Laminated Veneer Lumber.
- Product and manufacturing processes meet the stringent occupational health and safety requirements of the commercial and industrial construction industry.

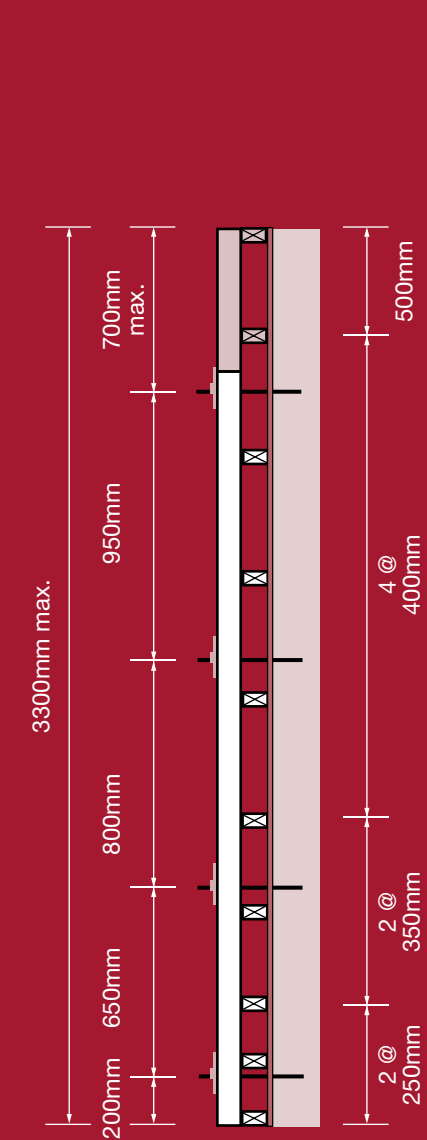
Use of e-form Data

The tables and other technical data provided in this publication are only applicable for e-form (manufactured by Wesbeam), which is the highest load-bearing LVL concrete formwork beam available in Australia. This data should not be used for look-alike or substitution products: Use of the e-form data for look-alike or substitution products could result in unsafe or unsatisfactory performance.

Standard Vertical Forms : Maximum Height : 3300mm and 4000mm (waler joists supporting formface)



For sections and plywood forface specification tables, see overleaf.



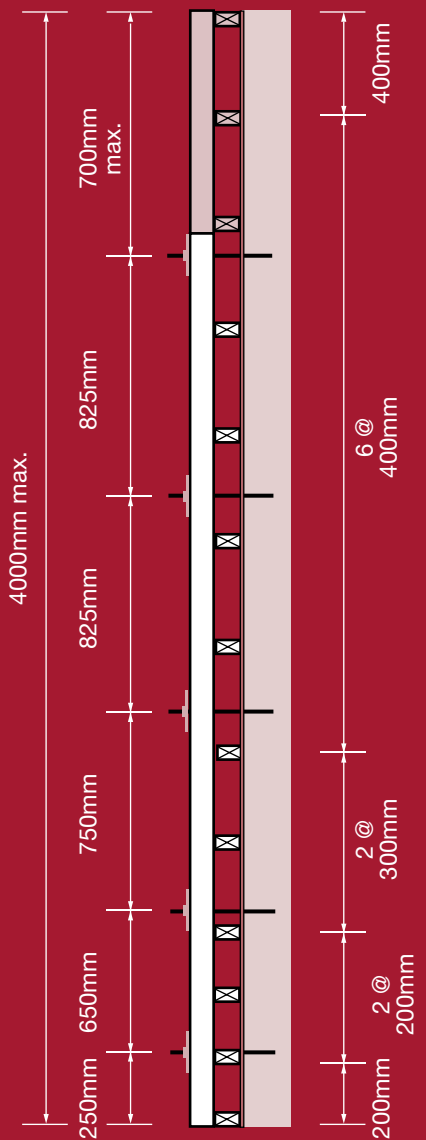
Section
Maximum Height : 3300mm

Note:
This form may be used for a reduced height down to 2700mm simply by deleting the top 600mm

Plywood formface specification : maximum height 3300mm		
Construction	Stress grade	Length or face grain orientation
17-10-7	F11	vertical only
17-10-7	F14	horizontal or vertical
17-16-7	F11	vertical only
17-16-7	F14	horizontal or vertical
Note: Maximum concrete pressure 79kPa (unfactored)		

General Notes :

1. Specification intended for achievement of a Class 3 finish – refer AS 3610.
2. Design based upon full fluid pressure.
3. Formface specifications assume plywood is continuous over at least 3 spans.
4. Holes for tie-rods must not be bored through any e-form component.
5. For plywood specifications – refer AS/NZS 2269



Section
Maximum Height : 4000mm

Note:
This form may be used for a reduced height down to 3400mm simply by deleting the top 600mm

Plywood formface specification : maximum height 4000mm		
Construction	Stress grade	Length or face grain orientation
17-10-7	F14	vertical only
17-16-7	F11	vertical only
Note: Maximum concrete pressure 94kPa (unfactored) Wale spacings accomodate 2400 long sheets used vertically		

e-form Joists Supporting Concrete Slabs

Concrete Slab Thickness (mm)	Nominal Size D x B (mm)	Joist Spacings (mm)											
		225	300	400	450	480	600	225	300	400	450	480	600
		Maximum Joist Span (m)											
		Single Span						Continuous Span					
100	95 x 47	1.9	1.7	1.5	1.5	1.5	1.3	2.3	2.1	1.9	1.8	1.8	1.6
	95 x 65	2.1	1.9	1.7	1.7	1.6	1.5	2.6	2.3	2.1	2.0	2.0	1.9
	130 x 65	2.9	2.6	2.4	2.3	2.2	2.1	3.5	3.2	2.9	2.8	2.7	2.5
	130 x 77	3.0	2.7	2.5	2.4	2.4	2.2	3.7	3.4	3.1	3.0	2.9	2.7
	150 x 77	3.5	3.2	2.9	2.8	2.7	2.5	4.3	3.9	3.6	3.4	3.3	3.1
150	95 x 47	1.8	1.6	1.5	1.4	1.4	1.3	2.2	2.0	1.8	1.7	1.7	1.5
	95 x 65	2.0	1.8	1.6	1.6	1.5	1.4	2.4	2.2	2.0	1.9	1.9	1.8
	130 x 65	2.7	2.5	2.2	2.1	2.1	2.0	3.3	3.0	2.8	2.6	2.6	2.4
	130 x 77	2.9	2.6	2.4	2.3	2.2	2.1	3.5	3.2	2.9	2.8	2.7	2.5
	150 x 77	3.3	3.0	2.7	2.6	2.6	2.4	4.1	3.7	3.4	3.2	3.2	2.9
200	95 x 47	1.7	1.5	1.4	1.3	1.3	1.2	2.1	1.9	1.7	1.6	1.6	1.4
	95 x 65	1.9	1.7	1.6	1.5	1.5	1.4	2.3	2.1	1.9	1.8	1.8	1.7
	130 x 65	2.6	2.3	2.1	2.0	2.0	1.9	3.2	2.9	2.6	2.5	2.5	2.3
	130 x 77	2.7	2.5	2.3	2.2	2.1	2.0	3.4	3.1	2.8	2.7	2.6	2.4
	150 x 77	3.1	2.9	2.6	2.5	2.4	2.3	3.9	3.5	3.2	3.1	3.0	2.8
300	95 x 47	1.6	1.4	1.3	1.2	1.2	1.1	1.9	1.7	1.6	1.5	1.4	1.3
	95 x 65	1.7	1.6	1.4	1.4	1.4	1.3	2.1	2.0	1.8	1.7	1.7	1.5
	130 x 65	2.4	2.2	2.0	1.9	1.8	1.7	2.9	2.7	2.4	2.3	2.3	2.1
	130 x 77	2.5	2.3	2.1	2.0	2.0	1.8	3.1	2.8	2.6	2.5	2.4	2.2
	150 x 77	2.9	2.6	2.4	2.3	2.3	2.1	3.6	3.3	3.0	2.8	2.8	2.6
400	95 x 47	1.4	1.3	1.2	1.2	1.1	1.1	1.8	1.6	1.4	1.3	1.3	1.2
	95 x 65	1.6	1.5	1.3	1.3	1.3	1.2	2.0	1.8	1.7	1.6	1.5	1.4
	130 x 65	2.2	2.0	1.8	1.8	1.7	1.6	2.8	2.5	2.3	2.2	2.1	1.9
	130 x 77	2.4	2.1	2.0	1.9	1.8	1.7	2.9	2.7	2.4	2.3	2.3	2.1
	150 x 77	2.7	2.5	2.3	2.2	2.1	2.0	3.4	3.1	2.8	2.7	2.6	2.4
600	95 x 47	1.3	1.2	1.1	1.0	1.0	1.0	1.6	1.4	1.3	1.2	1.1	1.0
	95 x 65	1.5	1.3	1.2	1.2	1.1	1.1	1.8	1.7	1.5	1.4	1.4	1.2
	130 x 65	2.0	1.8	1.7	1.6	1.6	1.5	2.5	2.3	2.0	1.9	1.8	1.7
	130 x 77	2.1	1.9	1.8	1.7	1.7	1.5	2.6	2.4	2.2	2.1	2.0	1.8
	150 x 77	2.5	2.2	2.0	2.0	1.9	1.8	3.0	2.8	2.5	2.4	2.3	2.1
1000	95 x 47	1.1	1.0	0.9	0.9	0.9	0.8	1.4	1.2	1.0	1.0	0.9	0.8
	95 x 65	1.3	1.2	1.1	1.0	1.0	0.9	1.6	1.4	1.2	1.2	1.1	1.0
	130 x 65	1.8	1.6	1.5	1.4	1.4	1.3	2.2	1.9	1.7	1.6	1.5	1.4
	130 x 77	1.9	1.7	1.5	1.5	1.4	1.3	2.3	2.1	1.8	1.7	1.7	1.5
	150 x 77	2.1	2.0	1.8	1.7	1.7	1.5	2.7	2.4	2.1	2.0	1.9	1.7

Notes for e-form Joists Tables

1. Design loads in accordance with AS 3610-1995 including 4 kPa for stacked materials for Stage I and Stage III loading.
2. Estimated deflections limited to the greater of span/270 or 3 mm.
3. For continuous span applications, design is based upon, (a) the most conservative of two or three span use, (b) all spans equally loaded and, (c) all spans equal.
4. Span values may be interpolated for intermediate concrete slab pour thicknesses.
5. Joists supporting formface sheeting, installed in accordance with standard formwork construction practices do not require additional intermediate buckling restraint.
6. Maximum spans apply for e-form in new or near new condition with moisture content < 15%.

e-form Bearers Supporting Concrete Slabs

Concrete Slab Thickness (mm)	Nominal Size D x B (mm)	Bearer Spacings (mm)											
		900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400
		Maximum Bearer Span (m)											
		Single Span						Continuous Span					
100	95 x 65	1.3	1.2	1.1	1.0	1.0	0.9	1.5	1.3	1.2	1.1	1.0	0.9
	130 x 65	1.8	1.6	1.5	1.4	1.4	1.3	2.1	1.8	1.6	1.5	1.4	1.3
	130 x 77	1.9	1.7	1.6	1.5	1.4	1.4	2.3	2.0	1.8	1.6	1.5	1.4
	150 x 77	2.2	2.0	1.9	1.7	1.7	1.6	2.6	2.3	2.0	1.9	1.7	1.6
	230 x 77	3.4	3.0	2.8	2.6	2.4	2.2	4.0	3.5	3.1	2.8	2.6	2.5
150	95 x 65	1.2	1.1	1.1	1.0	0.9	0.9	1.4	1.2	1.1	1.0	0.9	0.9
	130 x 65	1.7	1.5	1.4	1.4	1.3	1.2	2.0	1.7	1.5	1.4	1.3	1.2
	130 x 77	1.8	1.6	1.5	1.4	1.4	1.3	2.1	1.9	1.7	1.5	1.4	1.3
	150 x 77	2.1	1.9	1.8	1.7	1.6	1.5	2.5	2.1	1.9	1.7	1.6	1.5
	230 x 77	3.2	2.9	2.6	2.4	2.3	2.1	3.8	3.3	2.9	2.7	2.5	2.3
200	95 x 65	1.2	1.1	1.0	0.9	0.9	0.8	1.4	1.2	1.1	1.0	0.9	0.8
	130 x 65	1.6	1.5	1.4	1.3	1.2	1.1	1.9	1.6	1.4	1.3	1.2	1.1
	130 x 77	1.7	1.6	1.5	1.4	1.3	1.2	2.0	1.8	1.6	1.4	1.3	1.2
	150 x 77	2.0	1.8	1.7	1.6	1.5	1.4	2.3	2.0	1.8	1.6	1.5	1.4
	230 x 77	3.0	2.7	2.5	2.3	2.1	2.0	3.6	3.1	2.7	2.5	2.3	2.2
300	95 x 65	1.1	1.0	0.9	0.9	0.8	0.8	1.2	1.1	1.0	0.9	0.8	0.8
	130 x 65	1.5	1.4	1.3	1.2	1.1	1.0	1.7	1.5	1.3	1.2	1.1	1.0
	130 x 77	1.6	1.4	1.3	1.3	1.2	1.1	1.8	1.6	1.4	1.3	1.2	1.1
	150 x 77	1.8	1.7	1.5	1.5	1.4	1.3	2.1	1.8	1.6	1.5	1.4	1.3
	230 x 77	2.8	2.5	2.3	2.1	2.0	1.9	3.2	2.8	2.5	2.3	2.1	2.0
400	95 x 65	1.0	0.9	0.9	0.8	0.7	0.7	1.1	1.0	0.9	0.8	0.7	0.7
	130 x 65	1.4	1.3	1.2	1.1	1.0	0.9	1.5	1.3	1.2	1.1	1.0	0.9
	130 x 77	1.5	1.4	1.3	1.2	1.1	1.0	1.7	1.5	1.3	1.2	1.1	1.0
	150 x 77	1.7	1.6	1.5	1.4	1.3	1.2	1.9	1.7	1.5	1.4	1.3	1.2
	230 x 77	2.7	2.3	2.1	2.0	1.8	1.7	3.0	2.6	2.3	2.1	1.9	1.8
600	95 x 65	0.9	0.8	0.8	0.7	0.6	0.6	1.0	0.9	0.8	0.7	0.6	0.6
	130 x 65	1.3	1.2	1.0	1.0	0.9	0.8	1.4	1.2	1.0	1.0	0.9	0.8
	130 x 77	1.4	1.2	1.1	1.0	1.0	0.9	1.5	1.3	1.1	1.0	1.0	0.9
	150 x 77	1.6	1.4	1.3	1.2	1.1	1.0	1.7	1.5	1.3	1.2	1.1	1.0
	230 x 77	2.4	2.1	1.9	1.7	1.6	1.5	2.6	2.2	2.0	1.8	1.7	1.6
1000	95 x 65	0.8	0.7	0.6	0.6	0.5	0.5	0.8	0.7	0.6	0.6	0.5	0.5
	130 x 65	1.1	1.0	0.9	0.8	0.7	0.7	1.1	1.0	0.9	0.8	0.7	0.7
	130 x 77	1.2	1.1	0.9	0.9	0.8	0.7	1.2	1.1	0.9	0.9	0.8	0.7
	150 x 77	1.4	1.2	1.1	1.0	0.9	0.9	1.4	1.2	1.1	1.0	0.9	0.9
	230 x 77	2.0	1.8	1.6	1.5	1.4	1.3	2.1	1.8	1.6	1.5	1.4	1.3

Notes for e-form Bearers Tables

- Design loads in accordance with AS 3610-1995 including 4 kPa for stacked materials for Stage I and Stage III loading.
- Estimated deflections limited to the greater of span/270 or 3 mm.
- For continuous span applications, design is based upon, (a) the most conservative of two or three span use, (b) all spans equally loaded and, (c) all spans equal.
- Span values may be interpolated for intermediate concrete slab pour thicknesses.
- Bearers supporting joists, installed in accordance with standard formwork construction practices do not require additional intermediate buckling restraint.
- 230 x 77 bearers must be securely restrained against rollover at all supports.
- Maximum spans apply for e-form bearers in new or near new condition with moisture content < 15%.

Design Load and Deflection Table for e-form

e-form Section Size mm x mm	Span m	Maximum Design Load kN/m	Deflection for Unit Load mm/kN/m	Loads for Deflection Limits		Maximum Design Load kN/m	Deflection for Unit Load mm/kN/m	Loads for Deflection Limits	
				d = L/270 kN/m	d = 3mm kN/m			d = L/270 kN/m	d = 3mm kN/m
				Single Span				Multiple Spans	
95 x 47	0.9	24.0	0.25	13.6	12.2	24.0	0.13	25.6	23.0
	1.2	13.4	0.78	5.7	3.9	13.4	0.41	10.8	7.3
	1.5	8.6	1.90	2.9	1.6	8.6	1.01	5.5	3.0
	1.8	6.0	3.93	1.7	0.8	6.0	2.09	3.2	1.4
	2.1	4.4	7.28	1.1	0.4	4.4	3.86	2.0	0.8
	2.4	3.3	12.42	0.7	0.2	3.3	6.59	1.3	0.5
95 x 65	0.9	33.6	0.18	19.0	17.1	33.6	0.09	35.8	32.2
	1.2	18.9	0.55	8.0	5.4	18.9	0.29	15.1	10.2
	1.5	12.1	1.35	4.1	2.2	12.1	0.72	7.7	4.2
	1.8	8.5	2.81	2.4	1.1	8.5	1.49	4.5	2.0
	2.1	6.2	5.20	1.5	0.6	6.2	2.76	2.8	1.1
	2.4	4.7	8.87	1.0	0.3	4.7	4.71	1.9	0.6
130 x 65	0.9	63.1	0.07	48.7	43.8	63.1	0.04	91.7	82.5
	1.2	35.4	0.22	20.5	13.9	35.4	0.11	38.7	26.1
	1.5	22.7	0.53	10.5	5.7	22.7	0.28	19.8	10.7
	1.8	15.8	1.10	6.1	2.7	15.8	0.58	11.5	5.2
	2.1	11.5	2.03	3.8	1.5	11.5	1.08	7.2	2.8
	2.4	8.8	3.46	2.6	0.9	8.8	1.84	4.8	1.6
130 x 77	0.9	75.1	0.06	58.0	52.2	75.1	0.03	109.2	98.3
	1.2	42.2	0.18	24.5	16.5	42.2	0.10	46.1	31.1
	1.5	27.1	0.44	12.5	6.8	27.1	0.24	23.6	12.7
	1.8	18.7	0.92	7.2	3.3	18.7	0.49	13.6	6.1
	2.1	13.8	1.70	4.6	1.8	13.8	0.90	8.6	3.3
	2.4	10.6	2.91	3.1	1.0	10.6	1.54	5.8	1.9
150 x 77	0.9	99.9	0.04	89.0	80.1	99.9	0.02	167.7	151.0
	1.2	56.2	0.12	37.6	25.4	56.2	0.06	70.8	47.8
	1.5	36.0	0.29	19.2	10.4	36.0	0.15	36.2	19.6
	1.8	24.9	0.60	11.1	5.0	24.9	0.32	21.0	9.4
	2.1	18.4	1.11	7.0	2.7	18.4	0.59	13.2	5.1
	2.4	14.0	1.89	4.7	1.6	14.0	1.00	8.8	3.0
230 x 77	1.2	127.1	0.0	135.0	91.4	127.1	0.02	255.0	172.0
	1.8	56.5	0.17	40.1	18.1	56.5	0.09	75.6	34.0
	2.4	31.8	0.53	16.9	5.7	31.8	0.28	31.9	10.8
	3.0	20.4	1.28	8.7	2.3	20.4	0.68	16.3	4.4
	3.6	14.1	2.66	5.0	1.1	14.1	1.41	9.4	2.1
	4.2	10.4	4.93	3.2	0.6	10.4	2.61	6.0	1.1

Notes for use of Design Load and Deflection Tables

- Shaded values of 'loads for deflection' exceed the maximum design load for the strength limit state.
- To satisfy the strength limit state the design load calculated using factored load combinations given in AS 3610 must be less than the Maximum Design Load given in the Table.
- Maximum design load, based on capacity, is calculated using $\phi = 0.85$, $k_1 = 0.94$ & $k_{12} = 1.0$ – refer AS 3610 & AS 1720.1.
- Values given in the Table apply for e-form in new or near new condition with moisture content < 15%.
- Values of load or deflection may not be interpolated for spans intermediate to those included in the table.
- For multiple spans, values given have been determined on the basis of all spans being equal, uniform and equal loads to all spans and the most conservative of two or three span use.

Veneer

Species	Predominantly Maritime Pine
Grade	AS/NZS 2269
Thickness	3.2mm (nominal)
Moisture Content	8 - 15% (at time of despatch)
Joints	Outer 2 plies are scarf jointed Inner plies - scarf and/or butt jointed

Adhesive

Phenolic – AS 2754.1

Bond

Type A – AS/NZS 2098.2

Finish

Chamfered edges and red moisture repellent protective coating

Tolerances

Length	-0 mm, +20 mm
Width	-0 mm, +2 mm
Thickness	-2 mm, +2 mm
Spring	< (L/1000)

Structural Design

The tabular data and standard designs provided in this publication have been prepared in accordance with the following Australian Design Standards;

AS 3610 – 1995 Formwork for concrete.

AS 1720.1 – 1997 Timber structures, Part 1;

Design methods.

Design Assumptions

Capacity factor	ϕ	0.85
Duration of Load Factor		
- Strength	k_1	0.94
- Stiffness	j_2	1.00

Characteristic Design Values

Characteristic Strengths		
- Bending	(f'_b)	45.0 MPa
- Compression Parallel to Grain	(f'_c)	45.0 MPa
- Beam Shear	(f'_v)	5.0 MPa
- Bearing Perpendicular to Grain	(f'_p)	12.0 MPa
Characteristic Stiffness		
- Modulus of Elasticity	(E)	11,500 MPa
Joint Group Classification		
- Design Joint Group		JD4

e-form Properties

Nominal Size D x B (mm)	Mass of Member (kg/m)	Rigidity $EI_{xx} \times 10^9 \text{Nmm}^2$	Design Capacity	
			ϕM (kN.m)	ϕV (kN)
95 x 47	2.9	37.0	2.43	12.75
95 x 65	4.1	51.8	3.41	17.86
130 x 65	5.6	132.6	6.38	24.44
130 x 77	6.6	157.9	7.60	29.09
150 x 77	7.6	242.6	10.11	33.57
230 x 77	11.7	874.5	23.78	51.47

1. Design capacities calculated for $\phi = 0.85$ and for short duration load, $k_1 = 0.94$ - refer AS 3610 & AS 1720.1.
2. For bending capacity member is assumed laterally stable, $k_{12} = 1.0$ - refer AS 1720.1.
3. Design capacities and rigidity apply for e-form with moisture content < 15%.
4. Capacities and rigidity apply for 'on-edge' orientation of the section.
5. Estimated mass applies for e-form when dry ($m/c < 15\%$).

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