
wesbeam
building better wood

e-form
engineered formwork
Manufactured by Wesbeam Pty Ltd

AUSTRALIAN MADE

PRODUCT CERTIFIED
paa
ENGINEERED WOOD

JAS-ANZ
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e-form®

# 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 plantation timber veneers makes e-form one of the highest load-bearing formwork LVL beams 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 timbers.

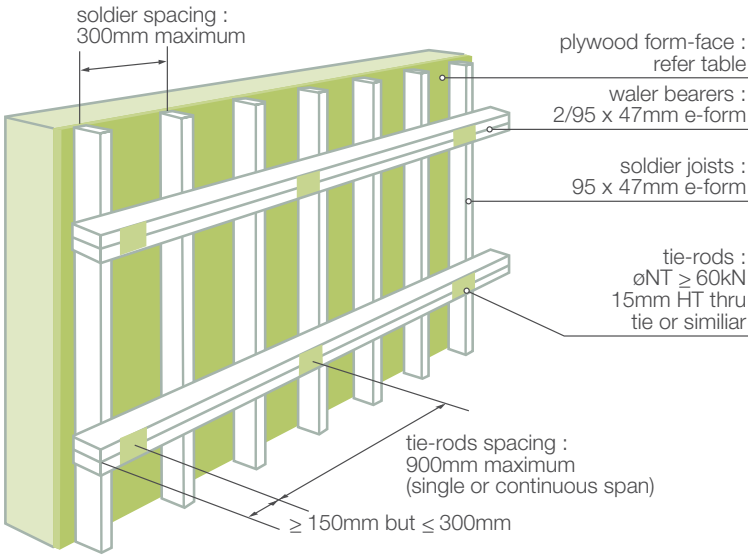
## Quality

- 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

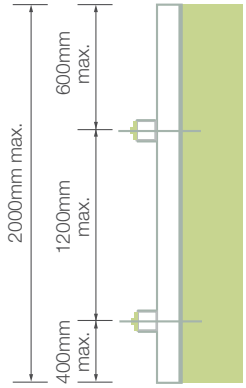
## Use of e-form Data

The tables and other technical data provided in this publication are only applicable for e-form (manufactured by Wesbeam), which is one of the highest load-bearing LVL concrete formwork beams 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: 2000mm

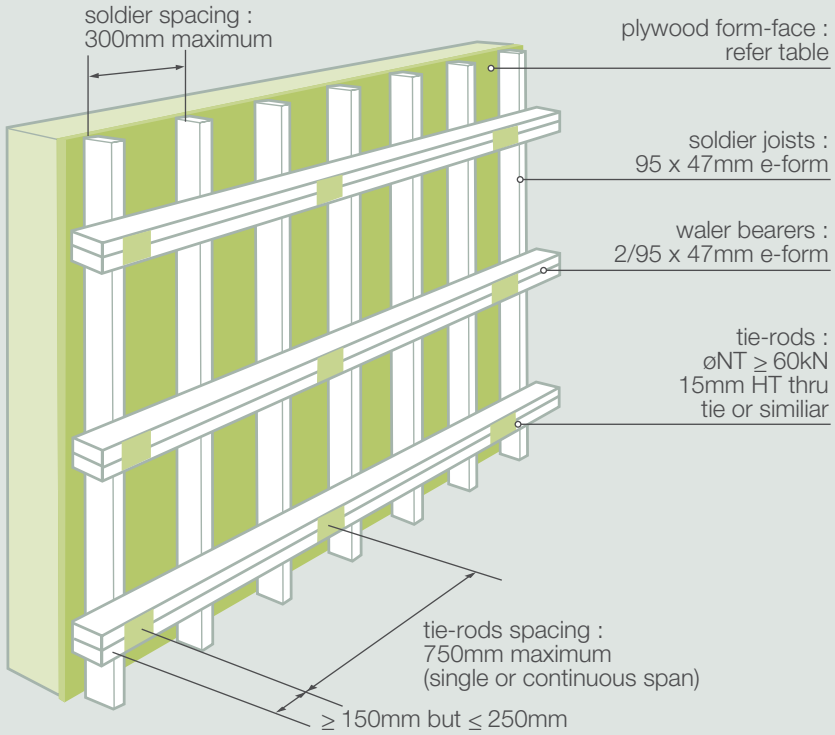



Section
Maximum Height : 2000mm

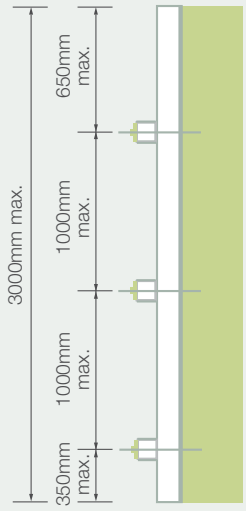



| Plywood formface specification – maximum height 2000mm | | |
|---|---|---|
| **Construction** | **Stress grade** | **Length or face grain orientation** |
| 17-10-7 | F11 | vertical only |
| 17-10-7 | F14 | horizontal or vertical |
| 17-15-7 | F14 | horizontal or vertical |

## Standard Vertical Forms: Maximum Height: 3000mm

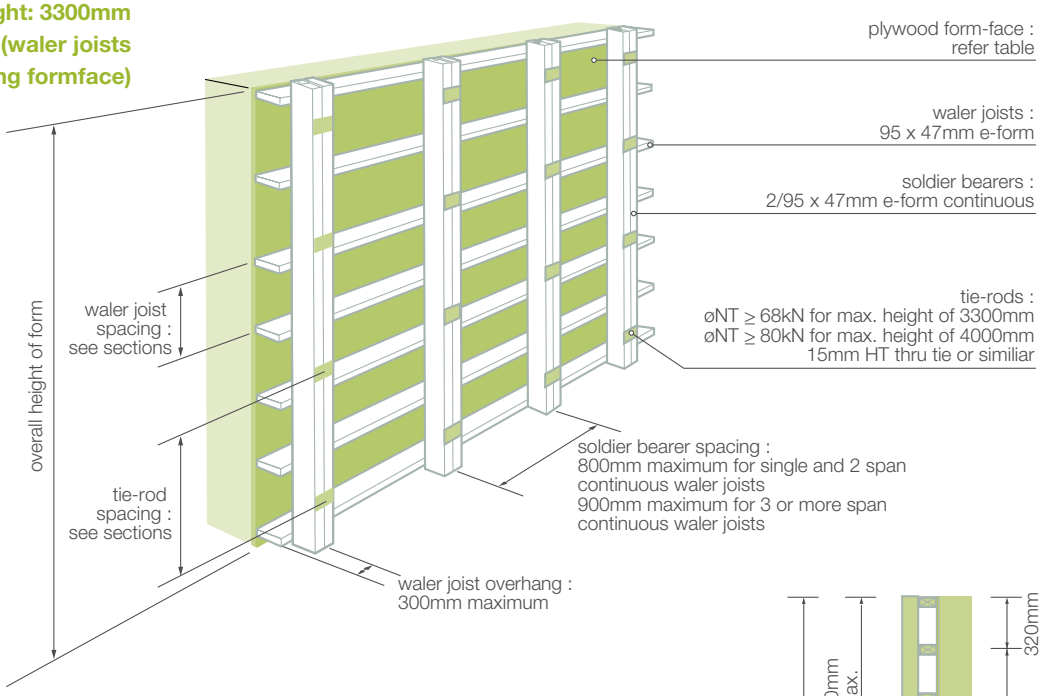



Section
Maximum Height : 3000mm




| Plywood formface specification – maximum height 3000mm | | |
|---|---|---|
| **Construction** | **Stress grade** | **Length or face grain orientation** |
| 17-10-7 | F11 | vertical only |
| 17-10-7 | F22 | horizontal or vertical |
| 17-15-7 | F17 | horizontal only |

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

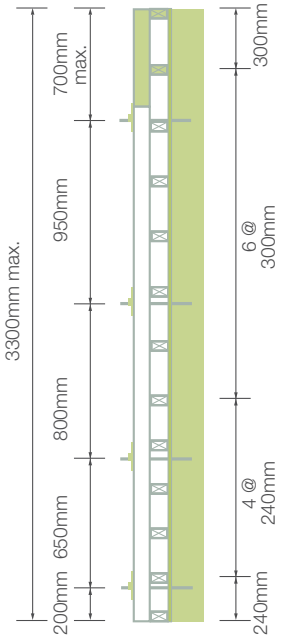



| Plywood formface specification : maximum height 3300mm | | |
|---|---|---|
| **Construction** | **Stress grade** | **Length or face grain orientation** |
| 17-10-7 | F11 | vertical only |
| 17-10-7 | F14 | horizontal or vertical |
| 17-15-7 | F11 | vertical only |
| 17-15-7 | F14 | horizontal or vertical |

Note: Maximum concrete pressure 79kPa (unfactored)

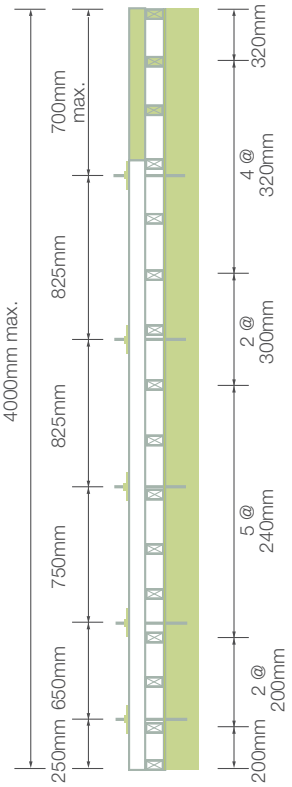
| Plywood formface specification : maximum height 4000mm | | |
|---|---|---|
| **Construction** | **Stress grade** | **Length or face grain orientation** |
| 17-10-7 | F14 | vertical only |
| 17-15-7 | F11 | vertical only |

Note: Maximum concrete pressure 94kPa (unfactored)
Wale spacings accomodate 2400 long sheets used vertically




Section
Maximum Height : 3300mm

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




Section
Maximum Height : 4000mm

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

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 6669

## E-FORM BEARERS SUPPORTING CONCRETE SLABS

| Concrete Slab Thickness (mm) | Nominal Size D x B (mm) | Bearer Spacing (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 900 | 1200 | 1500 | 1800 | 2100 | 2400 | 900 | 1200 | 1500 | 1800 | 2100 | 2400 |
| | | Maximum Bearer Span (m) | | | | | | | | | | | |
| | | Supporting Single Span Joists | | | | | | Supporting Continuous Span Joists | | | | | |
| 100 | 95x65 | 2.0 | 1.9 | 1.7 | 1.6 | 1.6 | 1.5 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.5 |
| | 150x77 | 3.4 | 3.1 | 2.9 | 2.7 | 2.6 | 2.5 | 3.4 | 3.1 | 2.8 | 2.7 | 2.5 | 2.4 |
| 150 | 95x65 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.8 | 1.7 | 1.5 | 1.5 | 1.4 | 1.3 |
| | 150x77 | 3.1 | 2.8 | 2.6 | 2.5 | 2.3 | 2.2 | 3.0 | 2.8 | 2.6 | 2.4 | 2.3 | 2.2 |
| 200 | 95x65 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 |
| | 150x77 | 2.9 | 2.6 | 2.4 | 2.3 | 2.2 | 2.1 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 2.0 |
| 300 | 95x65 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 |
| | 150x77 | 2.6 | 2.3 | 2.2 | 2.0 | 1.9 | 1.9 | 2.5 | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 |
| 400 | 95x65 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.9 |
| | 150x77 | 2.4 | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 | 2.3 | 2.1 | 2.0 | 1.8 | 1.8 | 1.7 |
| 600 | 95x65 | 1.3 | 1.1 | 1.1 | 1.0 | 0.9 | 0.9 | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 |
| | 150x77 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 2.1 | 1.9 | 1.7 | 1.6 | 1.5 | 1.3 |
| 1000 | 95x65 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 1.0 | 0.9 | 0.7 | 0.6 | 0.5 | 0.5 |
| | 150x77 | 1.8 | 1.6 | 1.5 | 1.4 | 1.2 | 1.1 | 1.7 | 1.6 | 1.4 | 1.2 | 1.0 | 0.9 |

Notes for use of Tables

**1** Design loads in accordance with AS 3610-2010 including 4 kPa for stacked materials for Stage I and Stage III loading.

**2** Estimated deflections limit – span/270.

**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** Bearers supporting joists, installed in accordance with standard formwork construction practices do not require additional intermediate buckling restraint.

**6** Maximum spans apply for e-form bearers in new or near new condition with moisture content not exceeding 15%.

## 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 | 2.3 | 2.1 | 1.9 | 1.8 | 1.8 | 1.7 | 2.9 | 2.5 | 2.2 | 2.0 | 2.0 | 1.8 |
| | 95 x 65 | 2.6 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 | 3.2 | 2.9 | 2.5 | 2.4 | 2.3 | 2.1 |
| | 150 x 77 | 4.2 | 3.9 | 3.5 | 3.4 | 3.3 | 3.1 | 5.2 | 4.8 | 4.4 | 4.1 | 4.0 | 3.6 |
| 150 | 95 x 47 | 2.1 | 1.9 | 1.7 | 1.7 | 1.6 | 1.5 | 2.6 | 2.3 | 2.0 | 1.9 | 1.8 | 1.6 |
| | 95 x 65 | 2.3 | 2.1 | 1.9 | 1.9 | 1.8 | 1.7 | 2.9 | 2.6 | 2.4 | 2.2 | 2.2 | 1.9 |
| | 150 x 77 | 3.9 | 3.5 | 3.2 | 3.1 | 3.0 | 2.8 | 4.8 | 4.4 | 4.0 | 3.8 | 3.7 | 3.3 |
| 200 | 95 x 47 | 1.9 | 1.8 | 1.6 | 1.5 | 1.5 | 1.4 | 2.4 | 2.2 | 1.9 | 1.8 | 1.7 | 1.5 |
| | 95 x 65 | 2.2 | 2.0 | 1.8 | 1.7 | 1.7 | 1.6 | 2.7 | 2.4 | 2.2 | 2.1 | 2.0 | 1.8 |
| | 150 x 77 | 3.6 | 3.3 | 3.0 | 2.9 | 2.8 | 2.6 | 4.4 | 4.0 | 3.7 | 3.5 | 3.5 | 3.1 |
| 300 | 95 x 47 | 1.7 | 1.6 | 1.4 | 1.4 | 1.4 | 1.3 | 2.1 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 |
| | 95 x 65 | 1.9 | 1.8 | 1.6 | 1.5 | 1.5 | 1.4 | 2.4 | 2.2 | 2.0 | 1.9 | 1.8 | 1.6 |
| | 150 x 77 | 3.2 | 2.9 | 2.7 | 2.6 | 2.5 | 2.3 | 4.0 | 3.6 | 3.3 | 3.2 | 3.1 | 2.8 |
| 400 | 95 x 47 | 1.6 | 1.5 | 1.3 | 1.3 | 1.2 | 1.2 | 2.0 | 1.8 | 1.5 | 1.5 | 1.4 | 1.3 |
| | 95 x 65 | 1.8 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 | 2.2 | 2.0 | 1.8 | 1.7 | 1.7 | 1.5 |
| | 150 x 77 | 3.0 | 2.7 | 2.5 | 2.4 | 2.3 | 2.1 | 3.7 | 3.3 | 3.0 | 2.9 | 2.8 | 2.5 |
| 600 | 95 x 47 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.7 | 1.5 | 1.3 | 1.3 | 1.2 | 1.0 |
| | 95 x 65 | 1.6 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.9 | 1.8 | 1.6 | 1.5 | 1.4 | 1.3 |
| | 150 x 77 | 2.6 | 2.4 | 2.2 | 2.1 | 2.0 | 1.9 | 3.2 | 2.9 | 2.7 | 2.5 | 2.5 | 2.2 |
| 1000 | 95 x 47 | 1.2 | 1.1 | 1.0 | 1.0 | 0.9 | 0.8 | 1.5 | 1.3 | 1.0 | 0.9 | 0.8 | 0.7 |
| | 95 x 65 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 1.7 | 1.5 | 1.3 | 1.2 | 1.2 | 0.9 |
| | 150 x 77 | 2.2 | 2.0 | 1.8 | 1.8 | 1.7 | 1.6 | 2.8 | 2.5 | 2.2 | 2.1 | 2.0 | 1.7 |

Notes for use of Tables

**1** Design loads in accordance with AS 3610-2010 including 4 kPa for stacked materials for Stage I and Stage III loading.

**2** Estimated deflections limit – span/270.

**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** Bearers supporting joists, installed in accordance with standard formwork construction practices do not require additional intermediate buckling restraint.

**6** Maximum spans apply for e-form bearers in new or near new condition with moisture content not exceeding 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 | 25.2 | 0.24 | 14.2 | 12.7 | 20.1 | 0.10 | 26.7 | 24.0 |
| | 1.2 | 15.0 | 0.74 | 6.0 | 4.0 | 15.0 | 0.31 | 11.3 | 7.6 |
| | 1.5 | 9.6 | 1.82 | 3.1 | 1.7 | 9.6 | 0.75 | 5.8 | 3.1 |
| | 1.8 | 6.6 | 3.77 | 1.8 | 0.8 | 6.6 | 1.56 | 3.3 | 1.5 |
| | 2.1 | 4.9 | 6.98 | 1.1 | 0.4 | 4.9 | 2.90 | 2.1 | 0.8 |
| | 2.4 | 3.7 | 11.91 | 0.7 | 0.3 | 3.7 | 4.94 | 1.4 | 0.5 |
| 95 x 65 | 0.9 | 34.8 | 0.17 | 19.6 | 17.6 | 27.9 | 0.07 | 36.9 | 33.2 |
| | 1.2 | 20.7 | 0.54 | 8.3 | 5.6 | 20.7 | 0.22 | 15.6 | 10.5 |
| | 1.5 | 13.2 | 1.31 | 4.2 | 2.3 | 13.2 | 0.55 | 8.0 | 4.3 |
| | 1.8 | 9.2 | 2.73 | 2.4 | 1.1 | 9.2 | 1.13 | 4.6 | 2.1 |
| | 2.1 | 6.8 | 5.05 | 1.5 | 0.6 | 6.8 | 2.10 | 2.9 | 1.1 |
| | 2.4 | 5.2 | 8.61 | 1.0 | 0.3 | 5.2 | 3.58 | 1.9 | 0.7 |
| 150 x 77 | 0.9 | 65.1 | 0.04 | 91.3 | 82.1 | 52.1 | 0.02 | 172.2 | 155.0 |
| | 1.2 | 48.9 | 0.12 | 38.5 | 26.0 | 39.1 | 0.05 | 72.7 | 49.0 |
| | 1.5 | 39.1 | 0.28 | 19.7 | 10.6 | 31.3 | 0.12 | 37.2 | 20.1 |
| | 1.8 | 27.1 | 0.58 | 11.4 | 5.1 | 26.1 | 0.24 | 21.5 | 9.7 |
| | 2.1 | 19.9 | 1.08 | 7.2 | 2.8 | 19.9 | 0.45 | 13.6 | 5.2 |
| | 2.4 | 15.3 | 1.85 | 4.8 | 1.6 | 15.3 | 0.77 | 9.1 | 3.1 |

Notes for use of Tables

**1** Shaded values of 'loads for deflection' exceed the maximum design load for the strength limit state.

**2** Estimated deflections limit – span/270. A deflection limit of 3mm is also included in the Table as some formwork designers may wish to use a tighter deflection limit.

**3** 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.

**4** Maximum design load, based on capacity, is calculated using Ø = 0.90, k1 = 0.94, k4 = 1.0, k6 = 0.9 & k12 = 1.0 – refer AS 1720.1.

**5** Values given in the Table apply for e-form in new or near new condition with moisture content not exceeding 15%.

**6** Values of load or deflection may not be interpolated for spans intermediate to those included in the table.

**7** 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.

## Structural Design

The Tabular data and standard designs listed in this publication have been prepared in accordance with the following Australian Standards;
AS1720.1 – 2010 – Timber Structures Part 1: Design Methods
AS3610 – 2010 – Formwork for Concrete
AS/NZS 6669 – Plywood – Formwork

## Design Assumptions

The following design assumptions are used in the preparation of the Tables in this publication, unless otherwise noted.

| **Capacity factor** | Ø = 0.90 |
|---|---|
| **Duration of Load Factor – AS1720.1 Part 2.4** | |
| – Strength –duration of peak action = 5 days | *k1* = 0.94 |
| – Moisture content –mc ≤ 15% | *k4* = 1.00 |
| – Moisture content – mc ≥ 15% and ≤ 20% | *k4* = 0.85 |
| – Temperature – in coastal regions of Queensland north of latitude 25°S, and all other regions of Australia north of latitude 16°S | *k6* = 0.90 |
| – Temperature – all other regions of Australia | *k6* = 1.00 |
| Strength sharing – bearers, joists, soldiers and whalers | *k9* = 1.00 |
| Stability factor | *k12* = 1.00 |
| **Deformation factor – AS1720.1 Fig 2.1 ( Duration of load – 5 days)** | |
| – mc ≤ 15% | J2 = 1.00 |
| – mc ≥ 15% and ≤ 20% | J2 = 1.00 |
| – mc ≥ 25% – Moisture content –mc ≤ 15% | J2 = 1.50 |
| **Joint Group Classification – AS1720.1 Part 4.1.2 Joint groups** | |
| – Design Joint Group – Seasoned LVL – Nails, bolts and screws | JD4 |
| **Cutting, Notching and Dimensional Changes** | |
| Design Loads and Design Capacities listed in the Tables apply to Wesbeam e-form LVL which has NOT been cut, notched or the member dimensions changed/altered. | |

## Characteristic Properties – e-form LVL

The Characteristic Design Properties, member Rigidity ($EI_{xx}$), member Bending Capacity ($M_d$) and member Shear Capacity ($V_d$) are available for component formwork design Engineers. Please contact Wesbeam Technical Services for e-form LVL Design information.

## e-form LVL Weight

| Nominal Size D x B (mm) | Mass of Member (kg/m) |
|---|---|
| 95 x 47 | 2.7 |
| 95 x 65 | 3.8 |
| 150 x 77 | 7.1 |

# SPECIFICATIONS

### Veneer

Thickness – Constant through the product thickness
Species – Plantation timber
Joints – Outer 2 plies are scarf jointed
Inner plies – scarf and/or butt jointed

### Moisture Content

8% – 15% (at time of dispatch)

### Dimensional Tolerances

Available on request

### Straightness

Available on request

### Density

650 kg/m³ (approximately)

### Adhesive

Phenolic – AS2754.1:2016 - Adhesives for timber and timber products; Adhesives for manufacture of plywood and laminated veneer lumber (LVL)

### Bond

Type A – AS/NZS2098.2:2012 - Methods of tests for veneer and plywood; Bond quality of plywood (chisel test)

### Joint Group

JD4 – for nails, bolts and screws

### Finish

Unsanded faces, sawn edges and arrised edges. Each piece of Wesbeam e-form LVL is coated with a high wax content coloured moisture repellent protective application

### Branding

Each piece of Wesbeam e-form LVL is branded as least once with the product name for identification and evidence of compliance with manufacturing control standards

### Storage

Store on level bearers at maximum 1800mm centres well clear of the ground, and cover to keep dry but allow ventilation

### Source

Plantation timber certified to AS4707:2014 - Chain of custody for forest products / PEFC

### Condition

Untreated

wesbeam
building better wood


ABN 89 004 268 017
WESB0339 November 2019

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