



WESBEAM E-FORM LVL CHARACTERISTIC VALUES & DESIGN CRITERIA

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NCC Building Material Compliance

Wesbeam e-form LVL is manufactured in accordance with *AS/NZS 4357 Structural Laminated Veneer Lumber* at our Neerabup facility in Western Australia. The LVL manufacturing process is independently 3rd party audited and certified by the Engineered Wood Products Association of Australasia (EWPAA) to ensure its compliance to AS/NZS 4357.

The EWPAA is an accredited LVL, I-Joist, plywood and veneer product certifier, by the peak certifying body in Australasia, the Joint Accreditation System – Australia and New Zealand (JAS-ANZ), accredited to *ISO17065: Product Certification* and *ISO17021: Management Systems*. JAS-ANZ certified products meet the acceptance criteria of the National Construction Code (NCC) of Australia; and State and Commonwealth purchasing authorities.

PRODUCT DESCRIPTION

Product Name

e-form LVL

Product Range

Breadth (mm)	Depth (mm)
47	95
65	95
77	130*
77	150

*130 mm x 77 mm by special order only.

Manufactured in Accordance with

AS/NZS 4357 Series of Standards

Product Certified by

Engineered Wood Products Association of Australasia (EWPAA)

Grading Method

In grade tested

In-mill Tested in Accordance with

AS/NZS 4357.0 and AS/NZS 4063 series

Veneer Species

Maritime Pine and/or Radiata Pine

Natural Durability

Class 4

Termite Resistance of Heartwood

Not resistant

Joints

Outer 2 veneers are scarf jointed, inner veneers are scarf and/or butt jointed

Dimensional Tolerances	Length	-0, +20 mm
	Depth	0, +2 mm
	Thickness	Available on request
Straightness	Spring & Bow	1 mm in 1000 mm
	Squareness	1 mm in 100 mm
	Twist	$\frac{\text{Length (mm)} \times \text{Width (mm)}}{3500 \text{ Thickness (mm)}}$
Treatment Methods	e-form is non-treated	
Timber Moisture Content	8-15% (at time of despatch)	
Adhesive	Phenolic to AS 2754.1-2016	
Bond	Type A to AS 2098.2-2012	
Finish and Surface Treatment	Unsanded faces with moisture repellent wax coating, sawn edges and edges arrised.	
Storage	Store on level bearers at 1800 mm centres well clear of ground, and keep cover to dry but allow ventilation.	

DESIGN CRITERIA

	Characteristic Values for Design for Wesbeam e-form LVL are determined by in-grade testing in accordance with AS/NZS 4063. The Characteristic Values for Design listed for Wesbeam e-form LVL apply only when the moisture content of the LVL in service is below 15%. Modification factors for design effects including changes in moisture and temperature are listed below and are to be used accordingly by the designer.		
References	(a) AS 1720.1 – Timber structures; Part 1 – Design Methods (b) AS 3610 Series: Formwork for concrete (c) AS/NZS 4063.1 – Characterization of structural timber; Part 1 – Test methods (d) AS/NZS 4063.2 – Characterization of structural timber; Part 2 – Determination of characteristic values (e) AS/NZS 4357.0 – Structural laminated veneer lumber Part 0: Specifications (f) Engineered Wood Products Association of Australasia: Structural Plywood and LVL Manual		
Required Undersize for Design	0mm x 0mm		
SERVICEABILITY LIMIT STATE			
Duration of Load Factor (Refer AS 1720.1 – Cl 2.4.1.2)	For recommended use as a formwork support member, the load duration is assumed to be 5 days. The Duration of Load Factor is dependent on the in-use moisture content (MC) at the time of load. The values for different in-use MC are listed here, for 5 days load duration. Typically, the MC can be assumed to be 20%. This value applies to the stiffness calculation when determining deflection.	MC ≤ 15% MC = 20% MC ≥ 25%	$j_2 = 1.23$ $j_2 = 1.35$ $j_2 = 1.47$
Moisture Content Factor for LVL (Refer AS1720.1 – Cl 8.4.3)	Where LVL is subject to conditions, such that the average moisture content for a 12-month period will exceed 15%, the following modification factors for stiffness shall be used, except where different values have been determined by testing. Typically, the MC can be assumed to be 20%. This value applies to the stiffness calculation when determining deflection.	MC ≤ 15% MC = 20% MC ≥ 25%	$j_6 = 1.0$ $j_6 = 0.9$ $j_6 = 0.8$
STRENGTH LIMIT STATE			
Volume Effect Multiplier	The volume effect multiplier applies to e-form bending members and applies to the characteristic properties prior to any other calculations.	$k = \left(\frac{95}{d}\right)^{0.140}$	
Capacity Reduction Factor (Refer AS 1720.1 – Cl 2.3)	The e-form used as part of a formwork support structure typically acts as a primary member.	$\phi = 0.9$	
Duration of Load Factor (Refer AS 1720.1 – Cl 2.4.1.1)	For the recommended use as part of a formwork structure, the load duration is assumed to be 5 days.	$k_1 = 0.94$	
Moisture Condition Multiplier (Refer AS 1720.1 – Cl 8.4.3)	e-form LVL is deemed to be a “seasoned timber” for the purpose of assigning a moisture condition multiplier. As the use of e-form in a system can involve high moisture surroundings, the 12-month moisture content (MC) should be considered in the design. Typically, the MC can be assumed to be 20%.	MC ≤ 15% MC = 20% MC ≥ 25%	$k_4 = 1.0$ $k_4 = 0.85$ $k_4 = 0.7$

Temperature Effect Multiplier (Refer AS 1720.1 – Cl 2.4.3)	In coastal regions of Queensland north of latitude 25°S, and all other regions of Australia north of latitude 16°S In all other regions of Australia	$k_e = 0.9$ $k_e = 1.0$
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Strength Sharing between Parallel Members (Refer AS 1720.1 – Cl 8.4.6)	Strength sharing factor for Wesbeam e-form LVL used as walers/soldiers in horizontal or vertical form	$k_g = 1.0$
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Wesbeam e-form LVL Characteristic Values for Design	The Characteristic Values for Design (Limit State) for use with AS 1720.1 have been determined in accordance with the requirements set forth in AS/NZS 4063. <table> <tr> <th colspan="2">Characteristic Values for Design</th><th>On Edge (MPa)</th></tr> <tr> <td>f'_b</td><td>Bending strength</td><td>40.0</td></tr> <tr> <td>f'_t</td><td>Tension strength – parallel to grain</td><td>17.5</td></tr> <tr> <td>f'_{tp}</td><td>Tension strength – perpendicular to grain</td><td>0.6</td></tr> <tr> <td>f'_c</td><td>Compression strength – parallel to grain</td><td>35.0</td></tr> <tr> <td>f'_{cp}</td><td>Compression strength – perpendicular to grain</td><td>16.0</td></tr> <tr> <td>f'_p</td><td>Bearing strength – perpendicular to grain</td><td>12.0</td></tr> <tr> <td>f'_l</td><td>Bearing strength – parallel to grain</td><td>35.0</td></tr> <tr> <td>f'_s</td><td>Shear strength</td><td>3.5</td></tr> <tr> <td>f'_{sj}</td><td>Shear at joints</td><td>4.5</td></tr> <tr> <td>E</td><td>Short duration average modulus of elasticity</td><td>10,800</td></tr> <tr> <td>G</td><td>Short duration average modulus of rigidity</td><td>540</td></tr> </table> NOTE: Refer to Wesbeam for properties on flat		Characteristic Values for Design		On Edge (MPa)	f'_b	Bending strength	40.0	f'_t	Tension strength – parallel to grain	17.5	f'_{tp}	Tension strength – perpendicular to grain	0.6	f'_c	Compression strength – parallel to grain	35.0	f'_{cp}	Compression strength – perpendicular to grain	16.0	f'_p	Bearing strength – perpendicular to grain	12.0	f'_l	Bearing strength – parallel to grain	35.0	f'_s	Shear strength	3.5	f'_{sj}	Shear at joints	4.5	E	Short duration average modulus of elasticity	10,800	G	Short duration average modulus of rigidity	540
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Other Wesbeam e-form LVL Properties	<table> <tr> <th colspan="2">Strength Group, Joint Group Classifications and Design Densities</th></tr> <tr> <td>Average Density (kg/m³)</td><td>650</td></tr> <tr> <td>Joint group for connector design (nails, screws and bolts)</td><td>JD4</td></tr> <tr> <td>Strength Group (Seasoned)</td><td>SD6</td></tr> </table>	Strength Group, Joint Group Classifications and Design Densities		Average Density (kg/m ³)	650	Joint group for connector design (nails, screws and bolts)	JD4	Strength Group (Seasoned)	SD6
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Average Density (kg/m ³)	650								
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Certification	These product properties apply to Wesbeam e-form branded LVL ONLY and cannot be used for other Wesbeam LVL products. NOTE: Characteristic Values for Design are subject to change without notice. Wesbeam Pty Ltd certify that Wesbeam e-form LVL is manufactured to conform to the LVL Characteristic Values for Design and the Design Criteria noted in this document, or if the above is modified by Wesbeam, then as advised in writing by way of update of this note, by Wesbeam. In addition, Wesbeam certify that when Wesbeam manufactured e-form LVL is designed and installed in accordance with the relevant Australian Standards and good building practice, Wesbeam e-form LVL complies with the requirements of the National Construction Code.
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