

Versa-Lam[®] LVL
Boise Cascade Company

PR-L266C
Revised March 20, 2023

Product: 1.8E 2650/1650, 1.9E 2750/1825, and 2.1E 3100/2150 Versa-Lam[®] LVL
Boise Cascade Company, 19953 Highway 31, Thorsby, Alabama 35171
(205) 646-1056
www.bcewp.com

1. Basis of the product report:
 - 2020 National Building Code of Canada: Clause 1.2.1.1 of Division A and Clauses 4.1, 4.3.1.1, and 9.23 of Division B
 - CSA O86-19 Engineering Design in Wood recognized in the 2020 NBC
 - ASTM D5456-18 recognized in CAN/CSA O86-19
 - APA Reports T97P-26, T98P-10, T2000P-24, T2002P-12, T2002P-15, T2003P-81A, T2004P-09, T2004P-25, T2004P-26, T2004P-48, T2005P-25, T2007P-08, T2007P-09, T2007P-10, T2007P-59, T2007P-98, T2016P-41A, T2017P-33, 2021P-14A, and other qualification data
2. Product description:

Versa-Lam[®] LVL is made with veneer sheets of various species and grades in accordance with the in-plant manufacturing standards approved by APA. Versa-Lam LVL is available in thicknesses from 19 mm (3/4 inch) to 89 mm (3-1/2 inches), widths of 89 mm (3-1/2 inches) to 1,219 mm (48 inches) and lengths up to 24 m (80 feet).
3. Design properties:

Table 1 lists the Limit States Design properties; Table 2 lists the equivalent relative densities for connection design; Table 3 lists the minimum fastener spacing for Versa-Lam LVL. The factored resistances for Versa-Lam LVL shall be in accordance with the recommendations provided by the manufacturer (www.bc.com/ewp/).
4. Product installation:

Versa-Lam LVL shall be installed in accordance with the recommendations provided by the manufacturer. Permissible details and maximum hole sizes shall be in accordance with the recommendations provided by the manufacturer.
5. Fire-rated assemblies:

Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer and approved by the authority having jurisdiction.
6. Limitations:
 - a) Versa-Lam LVL shall be designed in accordance with the code using the design properties specified in this report.
 - b) Versa-Lam LVL are limited to dry service conditions, as defined in CSA O86, at which the average equilibrium moisture content of solid-sawn lumber over a year is 15% or less and does not exceed 19%.
 - c) The Versa-Lam LVL are produced at Boise Cascade's facility in Thorsby, Alabama under a quality assurance program audited by APA.
 - d) This report is subject to re-examination in one year.
7. Identification:

Versa-Lam LVL described in this report is identified by a label bearing the manufacturer's name and/or trademark, the APA assigned plant number (1086 for the Thorsby plant), the

LVL grade, the APA logo, the report number PR-L266 (or PR-L266C), and a means of identifying the date of manufacture.

Identification may include one or more of the following:

Versa-Lam® LVL, Boise Cascade or Boise Cascade Wood Products, LLC.

Table 1. Specified Strengths and MOE (Limit States Design for Use in Canada) for Versa-Lam LVL ^(a,b)

True E ^(g)		Apparent E ^(f)		Flexural Stress, F _b , MPa ^(c,d)		Tension Parallel to Grain, F _t , MPa (psi) ^(e)	Comp. Parallel to Grain, F _c , MPa (psi)	Compression Perpendicular to Grain, F _{cL} , MPa (psi)		Horizontal Shear, F _v , MPa (psi)	
Product Grade	E, MPa (psi)	Product Grade	E, MPa (psi)	Joist	Plank			Perp. to Narrow Face (Plank)	Parallel to Narrow Face (Joist)	Parallel to Narrow Face (Plank)	Perp. to Narrow Face (Joist)
1.8E 2650/1650	12,411 (1.8x10 ⁶)	1.7 2650	11,721 (1.7x10 ⁶)	33.8 (4,900)	30.6 (4,435)	17.2 (2,494)	33.0 (4,788)	7.58 (1,100)	9.41 (1,365)	2.43 (353)	3.65 (530)
1.9E 2750/1825	13,101 (1.9x10 ⁶)	1.8 2750	12,411 (1.8x10 ⁶)	35.0 (5,080)	31.9 (4,620)	19.0 (2,759)	33.0 (4,788)	7.58 (1,100)	9.41 (1,365)	2.43 (353)	3.65 (530)
2.1E 3100/2150	14,480 (2.1x10 ⁶)	2.0 3100	13,789 (2.0x10 ⁶)	39.5 (5,730)	35.7 (5,175)	22.4 (3,250)	33.0 (4,788)	7.58 (1,100)	9.41 (1,365)	2.43 (353)	3.65 (530)

- (a) The tabulated values are specified strengths and modulus of elasticity for standard-term load duration. All values, except for E, are permitted to be adjusted for other load durations as permitted by the code. The tabulated values are limited to dry service conditions.
- (b) Joist = load parallel to glue-line. Plank = load perpendicular to glue-line.
- (c) Tabulated flexural stress (F_b) may be increased by 4% when members are used in a load-sharing system as defined in the CSA O86 15.3.2.4.
- (d) The tabulated plank values require no depth modification. The tabulated joist values are based on a reference depth of 305 mm (12 inches). For other depths, when loaded edgewise, the specified bending strength (f_b) shall be modified by (305/d)^{1/9}, where d = depth in mm. For depths less than 89 mm (3-1/2 inches), the factor for the 89 mm (3-1/2 inches) depth shall be used.

Grade	Depth mm (in.)	89 (3-1/2)	140 (5-1/2)	184 (7-1/4)	235 (9-1/4)	286 (11-1/4)	305 (12)	406 (16)	457 (18)	508 (20)	610 (24)
1.8E, 1.9E and 2.1E Versa-Lam	Multiply by	1.15	1.09	1.06	1.03	1.01	1.0	0.97	0.96	0.94	0.93

- (e) The tabulated values are based on a reference length of 6,096 mm (20 feet). For other lengths, the specified tensile strength shall be modified by (6,096/L)^{1/8} for all grades of Versa-Lam LVL, where L = length in mm. For lengths less than 1,219 mm (4 feet), the factor for the length of 1,219 mm (4 feet) shall be used.
- (f) The MOE values given are the apparent modulus of elasticity and include the effects of shear deformations. When calculating deflection, only the bending deformations need be included and the second term of the equation in footnote (g) may be ignored.
- (g) The MOE values given are the true (shear-free) modulus of elasticity. When calculating deflection, both bending and shear deformations must be included. The deflection equation for a simply-supported beam under uniform load is:

$$\delta = \frac{156.3 w L^4}{E b d^3} \times 10^6 + \frac{2400 w L^2}{E b d}$$

Where: δ = estimated deflection, mm w = uniform load, N/m
 L = span, m E = modulus of elasticity, MPa
 b = beam width, mm d = beam depth, mm

Table 2. Fastener Details for Versa-Lam ^(a)

LVL Grade	Equivalent Relative Density (G)					
	Nails and Wood Screws				Bolts and Lag Screws	
	Withdrawal Load		Lateral Load		Lateral Load	
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Installed in Face	
Parallel to Grain					Perpendicular to Grain	
1.8E, 1.9E and 2.1E VERSA-LAM	Spruce-pine-fir (SPF) (0.42)	Douglas-fir/larch (0.50)	Spruce-pine-fir (SPF) (0.42)	Douglas-fir/larch (0.50)	Douglas-fir/larch (0.50)	Douglas-fir/larch (0.50)

^(a) Fastener values determined using the equivalent relative densities in this table are for standard-term load duration and are permitted to be adjusted for other load durations as permitted by the code.

Table 3. Minimum Fastener Spacing for Installation Parallel to the Glue Line in Versa-Lam ^(a,b,c)

Minimum Member Size, mm (in.)	Connector: Length, mm (in.)	Nails Installed in the Narrow Face
		Minimum On-Center Spacing, mm (in.)
25 x 89 (1 x 3-1/2)	8d box or common, 10d box or common, 12d box or common, 16d sinker	152 (6)
	16d common	203 (8)
38 x 89 (1-1/2 x 3-1/2)	8d box or common, 10d box or common, 12d box or common, 16d sinker	152 (6)
	16d common	203 (8)
44 x 140 (1-3/4 x 5-1/2)	8d box or common, 10d box or common, 12d box or common, 16d sinker	102 (4)
	16d common	203 (8)
89 x 140 (3-1/2 x 5-1/2)	8d box or common, 10d box or common, 12d box or common, 16d sinker	102 (4)
	16d common	203 (8)

^(a) The minimum on-center spacing permitted for nails installed in the wide face of VERSA-LAM, i.e., perpendicular to the glue line, is the same as that permitted by the applicable code for solid-sawn lumber.

^(b) Edge distance is similar to Minimum On-Center Spacing.

^(c) Fastener sizes and minimum on-center spacing not specifically described above are beyond the scope of this report.

APA – *The Engineered Wood Association* is an approved national standards developer accredited by American National Standards Institute (ANSI). APA publishes ANSI standards and Voluntary Product Standards for wood structural panels and engineered wood products. APA is an accredited certification body under ISO/IEC 17065 by Standards Council of Canada (SCC), an accredited inspection agency under ISO/IEC 17020 by International Code Council (ICC) International Accreditation Service (IAS), and an accredited testing organization under ISO/IEC 17025 by IAS. APA is also an approved Product Certification Agency, Testing Laboratory, Quality Assurance Entity, Validation Entity, and Product Evaluation Entity by the State of Florida, and an approved testing laboratory by City of Los Angeles.

**APA – THE ENGINEERED WOOD ASSOCIATION
HEADQUARTERS**

7011 So. 19th St. ▪ Tacoma, Washington 98466
Phone: (253) 565-6600 ▪ Fax: (253) 565-7265 ▪ Internet Address: www.apawood.org

PRODUCT SUPPORT HELP DESK

(253) 620-7400 ▪ E-mail Address: help@apawood.org

DISCLAIMER

APA Product Report® is a trademark of APA – *The Engineered Wood Association*, Tacoma, Washington. The information contained herein is based on the product evaluation in accordance with the references noted in this report. Neither APA, nor its members make any warranty, expressed or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report. Consult your local jurisdiction or design professional to assure compliance with code, construction, and performance requirements. Because APA has no control over quality of workmanship or the conditions under which engineered wood products are used, it cannot accept responsibility for product performance for designs as actually constructed.