APA PRODUCT REPORT®

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VERSA-LAM® LVL — PR-L266(F)

Boise Cascade Wood Products, LLC

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Product: VERSA-LAM® LVL
Boise Cascade Wood Products, LLC, 19953 Highway 31, Thorsby, Alabama 35171
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www.bc.com/manufacturing/gp-lvl/ and www.bcewp.com

1. Basis of the product report:
   - 2020 Florida Building Code (FBC), Building: Section 2303.1.10 Structural composite lumber
   - 2020 FBC, Residential: Sections R502.1.5, R602.1.5, and R802.1.4 Structural composite lumber
   - ASTM D5456-14b Standard Specification for Evaluation of Structural Composite Lumber Products recognized by the 2020 FBC, Building and 2020 FBC, Residential
   - 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, and T2007P-98, T2016P-41A, and T2017P-33, 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 3/4 inch to 3-1/2 inches, widths of 3-1/2 inches to 48 inches, and lengths up to 80 feet.

3. Design properties:
   Table 1 lists the design properties, Table 2 lists the equivalent specific gravities for connection design, and Table 3 lists the allowable fastener spacing for VERSA-LAM LVL. The allowable loads for VERSA-LAM LVL shall be in accordance with the recommendations provided by the manufacturer.

4. Product installation:
   VERSA-LAM LVL shall be installed in accordance with the recommendations provided by the manufacturer.

5. Fire-rated assemblies:
   The provisions of Section 722.6 of the 2020 FBC, Building, Calculated Fire Resistances, shall be applicable to VERSA-LAM LVL. Fire-rated assemblies shall be constructed in accordance with the recommendations provided by APA Design/Construction Guide: *Fire-Rated Systems*, Form W305Y, dated June 2005, and the manufacturer.

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 is limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
   c) VERSA-LAM LVL products 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 are identified by a label bearing the manufacturer's name and/or trademark, the APA assigned plant number (1086), the LVL grade, the APA logo, the report number PR-L266, 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. Design Properties (Allowable Stress Design) for VERSA-LAM LVL (psi)[a,b]

True E		Apparent E		Flexural Stress, F_b[c,d]		Tension Parallel to Grain, F_t[e]	Comp. Parallel to Grain, F_c	Compression Perpendicular to Grain, $F_{c\perp}$		Horizontal Shear, F_v	
Product Grade	E ($x10^6$ psi)[g]	Product Grade	E ($x10^6$ psi)[f]	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	1.8	1.7 2650	1.7	2,650	2,400	1,650	3,000	450	750	175	285
1.9E 2750/1825	1.9	1.8 2750	1.8	2,750	2,500	1,825	3,000	450	750	175	285
2.1E 3100/2150	2.1	2.0 3100	2.0	3,100	2,800	2,150	3,000	450	750	175	285

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 lbf = 4.448 N, 1 psi = 6.9 kPa

[a] The tabulated values are design values for normal duration of load. All values, except for E and $F_{c\perp}$, are permitted to be adjusted for other load durations as permitted by the code. The design stresses are limited to conditions in which the maximum moisture content is less than 16 percent.

[b] Joist = load parallel to glueline; Plank = load perpendicular to glueline.

[c] Tabulated flexural stress (F_b) may be increased by 4 percent when the member qualifies as a repetitive member as defined in the NDS.

[d] The tabulated plank values require no depth modification. The tabulated joist values are based on a reference depth of 12 inches. For other depths, when loaded edgewise, the allowable bending stress (F_b) shall be modified by $(12/d)^{1/9}$ for 1.8E, 1.9E, and 2.1E VERSA-LAM, as shown in the following table. For depths less than 3-1/2 inches, the factor for the 3-1/2-inch depth shall be used.

	Depth (in.)	3-1/2	5-1/2	7-1/4	9-1/4	11-1/4	12	16	18	20	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 4 feet. For other lengths, the allowable tensile stress shall be modified by $(4/L)^{1/8}$ for all grades of VERSA-LAM LVL, where L = length in feet. For lengths less than 4 feet, use the allowable tension stresses in Table 1 unadjusted.

[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:

$$\delta = \frac{270wL^4}{Ebh^3} + \frac{28.8wL^2}{Ebh}$$

Where: δ = Estimated total deflection, inches; w = uniform load, plf; L = span, feet; E = tabulated true modulus of elasticity, psi; b = beam width, inches; h = beam depth, inches

Table 2. Fastener Details for VERSA-LAM LVL

LVL Grade	Equivalent Specific Gravity (S.G.)					
	Nails				Bolts	
	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	Hemlock/ fir (0.43)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)

Table 3. Allowable Fastener Spacing for Installation Parallel to the Glue Line in VERSA-LAM LVL[(a)]

Minimum Member Size (in.)	Connector Size	Nails Installed in the Narrow Face
		On-Center Spacing (in.)
3/4 x 3-1/2	10d box and common nails	6
	16d sinker and 12d common nails	6
	14 gage staples	6
1-3/4 x 5-1/2	10d box and common nails	4
	16d sinker and 12d common nails	4
	14 gage staples	4
	16d common nails	8

For SI: 1 inch = 25.4 mm

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

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, and Validation Entity by the State of Florida, and an approved testing laboratory by City of Los Angeles.

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