

Roseburg LVL Studs
Roseburg Forest Products

PR-L270

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Products: Roseburg RigidLam[®] LVL Studs
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1. Basis of the product report:
 - 2018 and 2015 International Building Code (IBC): Sections 104.11 Alternative materials and 2303.1.10 Structural composite lumber
 - 2012 and 2009 IBC: Sections 104.11 Alternative materials and 2303.1.9 Structural composite lumber
 - 2018 and 2015 International Residential Code (IRC): Section R104.11 Alternative materials, and IRC Sections R502.1.5, R602.1.5, and R802.1.4 Structural composite lumber
 - 2012 and 2009 IRC: Section R104.11 Alternative materials, and 2012 IRC Sections R502.1.7, R602.1.4, and R802.1.6 Structural composite lumber
 - 2015 ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) recognized by the 2018 and 2015 IBC
 - 2008 ANSI/AF&PA SDPWS recognized by the 2012 and 2009 IBC
 - ASTM D5456-19, Standard Specification for Evaluation of Structural Composite Lumber Products
 - ASTM D5456-14b, ASTM D5456-13, D5456-09 and D5456-05a recognized by the 2018 IBC and IRC, 2015 IBC and IRC, 2012 IBC and IRC, and 2009 IBC, respectively
 - APA Reports T2000P-30, T2001P-11, T2001P-15, T2001P-22, T2001M-81, T2001M-87, T2003P-16, T2003P-33, T2004P-8, T2005P-50, T2007P-24, T2007P-25A, T2007P-26A, T2007P-30, T2007P-32, T2010P-31, T2010P-32, T2011P-34A, T2014P-23, T2015P-06, and T2019P-41, and other qualification data
2. Product description:

Roseburg RigidLam[®] laminated veneer lumber (LVL) studs are used as wall framing materials in conventional light-frame construction of the applicable code. RigidLam LVL studs are also used as wall framing materials in engineered walls. The minimum thickness of the LVL studs is 1-1/2 inches. The LVL studs described in this report are 1.6E or 2.1E Grade LVL, produced at the Roseburg engineered wood products plant located Riddle, Oregon, made in accordance with the in-plant manufacturing standard and quality manual approved by APA.
3. Design properties:

The allowable design properties for Roseburg RigidLam LVL studs shall be in accordance with Table 1 provided in this report. The allowable shear values for nailed wood structural panel shear walls using RigidLam LVL studs shall be determined using Table 2306.3 of the 2009 IBC or Section 4.3.3 and Table 4.3A of the 2008 and 2015 SDPWS where the RigidLam LVL studs shall be considered to be equivalent to sawn lumber studs with a specific gravity of 0.50.
4. Product installation:
 - a) Prescriptive Stud Wall Applications: Cutting, notching and boring of RigidLam LVL studs used in conventional construction is permitted in accordance with Sections 2308.5.9 and 2308.5.10 of the 2018 and 2015 IBC, Sections 2308.9.10 and 2308.9.11 of the 2012 and

- 2009 IBC, and Section R602.6 of the 2018 through 2009 IRC. Stud wall nailing restrictions and requirements are presented in Section 4(c).
- b) Engineered Stud Wall Applications: Cutting, notching and boring of RigidLam LVL studs shall be permitted in engineered wall applications with the following restrictions:
 - i) Notches: A notch up to 40 percent of the width of the stud may be placed anywhere along the stud provided the reduced section is accounted for using standard engineering analysis and the allowable bending and/or tension stress is reduced by 30 percent to account for the stress concentrations that occur at the corners of the notch.
 - ii) Holes: A hole with a maximum diameter of 30 percent of the width of the stud may be placed anywhere along the stud, at the centerline of the stud width, without further engineering analysis for lateral bending considerations. For other conditions, holes may be placed anywhere along the stud provided the reduced section is accounted for using standard engineering analysis.
 - iii) Stud wall nailing restrictions and requirements are presented in Section 4(c).
 - c) Stud Wall Nailing Restrictions and Requirements:
 - i) For sheathing attached with 10d common nails (0.148 inch x 3 inches) or smaller, spaced no closer than 6 inches on center, a single RigidLam LVL stud may be used for framing at adjoining panel edges.
 - ii) For sheathing attached with 8d common nails (0.131 inch x 2-1/2 inches) or 10d common nails (0.148 inch x 3 inches) spaced closer than 6 inches on center, a double LVL stud is required at adjoining panel edges. Double RigidLam LVL studs must be stitch-nailed together using a minimum of the same size and frequency of the nailing required to attach the sheathing to the framing at the panel edges. Panel-edge nails must be installed a minimum 3/8 inch from the panel edges, and must be staggered a minimum of 1/2 inch within each line of nails.
 - iii) 8d common (0.131 inch x 2-1/2 inches) and smaller nails shall not be spaced closer than 3 inches on center. 10d common nails (0.148 inch x 3 inches) shall not be spaced closer than 4 inches on center.
 - iv) Maximum nail size is 10d common (0.148 inch x 3 inches).
5. Fire-rated assemblies:
- 5.1 Prescriptive Stud Wall Applications: When used as wall studs in fire-resistance-rated prescriptive construction, Roseburg RigidLam LVL may be considered a direct replacement for solid-sawn lumber having the same dimensions in any fire-resistance-rated wall assembly listed in Table 721.1(2) of the 2018, 2015, and 2012 IBC or Table 720.1(2) of the 2009 IBC. A minimum of 2.5 lbf/ft³ mineral wool insulation shall be placed in the stud cavity.
 - 5.2 Engineered Stud Wall Applications: When used as wall studs in fire-resistance-rated engineered wall construction, Roseburg RigidLam LVL may be used in the design and construction of one-hour fire-resistance-rated wall assemblies listed in Table 721.1(2) of the 2018, 2015, and 2012 IBC or Table 720.1(2) of the 2009 IBC with the limitations listed below, provided that the applied axial stress (f_c) on each stud does not exceed 365 psi for 1.6E, and 488 psi for 2.1E Roseburg RigidLam LVL. When the slenderness ratio of the stud exceeds 33, F_c' shall be multiplied by 0.66. F_c' is equal to the $F_{c||}$ value shown in Table 1 for each stud grade further adjusted for all applicable adjustment factors, including the column stability factor, in accordance with the NDS.
 - a) The stud spacing shall be no greater than 24 inches on center,
 - b) The top and bottom plates of the wall shall be constructed in accordance with the nailing schedule specified in Table 2304.10.1 of the 2018 and 2015 IBC, Table 2304.9.1 of the 2012 or 2009 IBC or Table R602.3(1) of the 2018 through 2009 IRC.

- c) The wall shall be covered with one layer of 5/8-inch Type X gypsum wall board attached to studs with 2-1/4-inch long Type S drywall screws at 7 inches on center on the perimeter and in the field, and
 - d) A minimum of 2.5 lbf/ft³ mineral wool insulation shall be placed in the stud cavity.
6. Limitations:
- a) Roseburg RigidLam LVL studs shall be designed in accordance with the code using the design properties specified in this report.
 - b) Roseburg RigidLam LVL studs are limited to dry service conditions where the average equilibrium moisture content is less than 16 percent.
 - c) Roseburg RigidLam LVL studs are produced at the Roseburg Forest Products' facility in Riddle, Oregon under a quality assurance program audited by APA.
 - d) This report is subject to re-examination in one year.
7. Identification:
- Roseburg RigidLam LVL described in this report is identified by a label bearing the manufacturer's name (Roseburg Forest Products) and/or trademark, the APA assigned plant number (1055), the LVL grade, the APA logo, the report number PR-L270, and a means of identifying the date of manufacture.

Table 1. Allowable Design Values for Roseburg RigidLam LVL^(a,b)

True E		Apparent E		Flexural Stress, F _b (psi) ^(e)		Tension Parallel to Grain, F _t (psi) ^(h)	Comp. Parallel to Grain, F _c (psi)	Compression Perpendicular to Grain, F _{cl} (psi)		Horizontal Shear, F _v (psi)	
Product Grade	E _{true} (10 ⁶ psi) ^(c)	Product Grade	E _{apparent} (10 ⁶ psi) ^(d)	Beam ^(f)	Plank ^(g)			Beam	Plank ⁽ⁱ⁾	Beam	Plank
1.6E	1.6	1.5E	1.5	2,250	2,250	1,500	1,950	575	650	220	130
2.1E	2.1	2.0E	2.0	3,100	3,100	2,100	3,000	750	650	290	130

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

- (a) Design values provided in this table are based on covered, dry conditions of use. Dry conditions of use are those environmental conditions represented by solid sawn lumber in which the moisture content is less than 16 percent. All values, except for E and F_{cl}, are permitted to be adjusted for other load durations as permitted by the code.
- (b) Beam (edgewise) = load parallel to glue-line; plank (flatwise) = load perpendicular to glue-line.
- (c) The tabulated MOE values are the shear-free modulus of elasticity. When calculating deflection, both bending and shear deflections must be included. The deflection equation for a simple-span beam under uniform load is:

$$\delta_{true} = \frac{270 wL^4}{E_{true}bh^3} + \frac{28.8wL^2}{E_{true}bh}$$

Where:

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

- (d) The tabulated MOE values are the apparent modulus of elasticity and include the effects of shear deflection. When calculating deflection, only the bending deflection needs to be included. The deflection equation for a simple-span beam under uniform load is:

$$\delta_{apparent} = \frac{270 wL^4}{E_{apparent}bh^3}$$

Where:

δ	=	Estimated total deflection, inches	w	=	uniform load, plf
L	=	span, feet	E _{apparent}	=	tabulated apparent modulus of elasticity, psi
b	=	beam width, inches	h	=	beam depth, inches

- (e) The tabulated F_b values are permitted to be increased by 4 percent for repetitive members as provided in the code.
- (f) The tabulated 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 a depth factor, K_d = (12/d)^(1/8), where d is the LVL depth in inches. For depths less than 3-1/2 inches, multiply the tabulated value by 1.17. The size factor is cumulative with other adjustment factors including duration of load and repetitive member factors.
- (g) The tabulated values are based on a reference LVL thickness of 1-3/4 inches. For other thicknesses, when loaded flatwise, the allowable bending stress (F_b) shall be modified by a thickness factor, K_t = (1.75 /t)^(1/5), where t is the LVL thickness in inches. For thicknesses less than 1-3/4 inches, the factor for the 1-3/4-inch thickness shall be used.

- (h) Tabulated tensile stresses are for a 4-foot LVL length. For greater lengths, the value shall be adjusted by multiplying the tabulated value by $(4.0/L)^{1/3}$, where L is the LVL length in feet. For lengths less than 4 feet, use the tabulated value unadjusted.
- (i) The tabulated compressive stress perpendicular to grain ($F_{c\perp}$) value is based on the average stress at the proportional limit or 0.04-in. deformation, whichever is less, in accordance with ASTM D5456-19.

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