APA PRODUCT REPORT®

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Roseburg RigidLam® LVL and RigidRim® LVL Rimboard PR-L289
Roseburg Forest Products Company Revised September 19, 2023

Products: RigidLam® LVL and RigidRim® LVL Rimboard
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1. Basis of the product report:
   - 2021, 2018, and 2015 International Building Code (IBC): Sections 104.11 Alternative materials and 2303.1.10 Structural composite lumber
   - 2012 IBC: Sections 104.11 Alternative materials and 2303.1.9 Structural composite lumber
   - 2021, 2018, and 2015 International Residential Code (IRC): Sections R104.11 Alternative materials, and R502.1.5, R602.1.5, and R802.1.4 Structural composite lumber
   - 2012 IRC: Sections R104.11 Alternative materials, and R502.1.7, R602.1.4, and R802.1.6 Structural composite lumber
   - ASTM D5456-18, ASTM D5456-14b, ASTM D5456-13, and ASTM D5456-09 recognized in the 2021 IBC and IRC, 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
   - ASTM D7672-14e1, ASTM D7672-14, and ASTM D7672-12 recognized in the 2021 IBC and IRC, 2018 IBC and IRC, and 2015 IBC and IRC, respectively
   - 2021, 2015, and 2008 ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) recognized in the 2021, 2018 and 2015, and 2012 IBC, respectively
   - APA Reports T2000P-19, T2000P-30, T2001P-11, T2001P-15, T2001P-22, T2001M-81, T2001M-87, T2003P-16, T2003P-33, T2003P-42A, T2003P-49A, T2004P-8, T2005P-50, T2007P-24, T2007P-25A, T2007P-26A, T2007P-30, T2007P-32, T2007P-101, T2010P-27, T2010P-31, T2010P-32, T2011P-34A, T2011P-35, T2014P-23, T2015P-06, T2016P-32, T2017P-17, T2018P-01, T2019P-13, T2019P-15, T2019P-42, T2019P-49, T2020-P28, T2021P-53, and T2023P-24, and other qualification data

2. Product description:
   Roseburg RigidLam® laminated veneer lumber (LVL) is a structural composite lumber product consisting of either Douglas-fir (DF) or Southern pine (SP) veneers laminated with grain parallel to the length of the member in accordance with the in-plant manufacturing standard approved by APA. Roseburg RigidLam DF LVL is available in thicknesses of 1-1/4 to 7 inches, depths of 3-1/2 to 48 inches, and lengths up to 66 feet. RigidLam DF LVL thickness greater than 2-1/2 inches are fabricated by means of a secondary face-bonding process. Roseburg RigidLam SP LVL is available in thicknesses of 1-1/4 to 5-1/2 inches, depths of 3-1/2 to 24 inches, and lengths up to 66 feet.

   Roseburg RigidLam® LVL studs are made of DF veneers only and 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 either 1.6E or 2.1E grade DF LVL.

   Roseburg RigidRim® LVL Rimboard is made of DF veneers only. The RigidRim® LVL Rimboard described in this report is 1.4E grade LVL and is available in thicknesses of 1-1/2 to 3-1/2 inches. The 3-1/2-inch LVL rim board is face-bonded from 1-3/4-inch thick DF LVL products.

3. Design properties:
The structural design provisions for wood construction provided in the building code are applicable to Roseburg RigidLam LVL, RigidLam LVL studs, and RigidRim LVL Rimboard, unless noted otherwise in this report. Table 1 lists the allowable design properties and Table 2 lists the equivalent specific gravities for connection design.

3.1 Beams, headers, and Rim board:
The allowable spans for Roseburg RigidLam LVL and RigidRim LVL Rimboard shall be in accordance with the recommendations provided by the manufacturer (www.roseburg.com). Table 3 lists the allowable loads and prescribed nail size and spacing for RigidRim LVL Rimboard, and Table 4 shows the minimum nail spacing for Roseburg RigidLam LVL.

3.2 Wall framing:
The allowable shear values for nailed wood structural panel shear walls using RigidLam LVL studs shall be determined using Section 4.3.3 and Table 4.3A of the 2015 and 2008 SDPWS or Table 2306.3 of the 2009 IBC, where the RigidLam LVL studs shall be considered to be equivalent to sawn lumber studs with a specific gravity of 0.50. RigidLam LVL stud wall nailing restrictions and requirements are presented in Section 4.2.3.

4. Product installation:

4.1 Beams, headers, and Rim board:
Roseburg RigidLam LVL and RigidRim LVL Rimboard shall be installed in accordance with the recommendations provided by the manufacturer (see link above).

4.2 Wall framing:

4.2.1 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. RigidLam LVL stud wall nailing restrictions and requirements are presented in Section 4.2.3.

4.2.2 Engineered Stud Wall Applications: Cutting, notching and boring of RigidLam LVL studs shall be permitted in engineered wall applications with the following restrictions:
a) 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.
b) Holes: A hole with a maximum diameter of 30 percent of the width of the stud may be placed anywhere along the stud and 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.
c) Stud wall nailing restrictions and requirements are presented in Section 4.2.3.

4.2.3 RigidLam LVL Stud Wall Nailing Restrictions and Requirements:
a) 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 edge.
b) 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 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.

c) 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.

d) Maximum nail size is 10d common (0.148 inch x 3 inches).

5. Fire-rated assemblies:

5.1 Design of fire-resistant exposed wood members in accordance with Chapter 16 of the National Design Specification for Wood Construction (NDS), Section 722.1 of the 2021, 2018, and 2015 IBC, or Section 722.6.3 of the 2012 IBC shall be applicable to Roseburg RigidLam LVL and RigidRim LVL Rimboard. Fire-rated assemblies for Roseburg RigidLam LVL and RigidRim LVL Rimboard shall be constructed in accordance with the recommendations provided by APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (www.apawood.org/resource-library) and the manufacturer (see link above). Fire-rated assemblies for Roseburg RigidRim LVL Rimboard shall be constructed in accordance with APA Product Report PR-S259.

5.2 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/ft^3 mineral wool insulation shall be placed in the stud cavity.

5.3 Engineered Stud Wall Applications: When used as wall studs in fire-resistance-rated engineered wall construction, Roseburg RigidLam LVL is permitted for use 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 in Items (a) through (d) in this paragraph 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, the F_c', which is 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, shall be multiplied by 0.66.

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/ft^3 mineral wool insulation shall be placed in the stud cavity.

6. Limitations:

a) Roseburg RigidLam LVL, RigidLam LVL studs, and RigidRim LVL Rimboard shall be designed in accordance with the code using the allowable design properties specified in this report.

b) Roseburg RigidLam LVL, RigidLam LVL studs, and RigidRim LVL Rimboard are limited to dry service conditions where the average moisture content of sawn lumber is less than 16%.

c) Roseburg RigidLam DF LVL (all grades), RigidLam DF LVL studs, and RigidRim DF LVL Rimboard are produced at Roseburg Forest Products' facility in Riddle, OR. Roseburg RigidLam DF LVL (3100Fb-2.0E apparent and 2250Fb-1.5E apparent) and Roseburg RigidLam SP LVL are produced at Roseburg Forest Products' facility in Chester, SC.

d) Roseburg RigidLam LVL, RigidLam LVL Studs and RigidRim LVL Rimboard are under a quality assurance program audited by APA.
e) This report is subject to re-examination in one year.

7. Identification:
The Roseburg RigidLam LVL, RigidLam LVL studs, and RigidRim LVL Rimboard described in this report are identified by a label bearing the company name, the product name, the product grade, the APA assigned plant number (1055 for Riddle, OR and 1125 for Chester, SC), the APA logo, the report number PR-L289, and a means of identifying the date of manufacture. The RigidLam product name shall be permitted to be labelled as "onCENTER®".

Table 1. Allowable Design Values for Roseburg RigidLam LVL and 1.4E RigidRim LVL Rimboard[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, $F_{c\perp}$ (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
1.4E[j]	1.4	1.3E[j]	1.3	2,250	2,250	1,500	1,950	560	650	200	130
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
2.3E[j]	2.3	2.2E[j]	2.2	3,100	3,100	2,100	3,000	750	650	290	130
2.4E[j]	2.4	--	--	3,400	3,400	2,425	3,200	850	650	325	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 $F_{c\perp}$, are permitted to be adjusted for other load durations as permitted by the code.

[b] Beam (edgewise) = load parallel to glueline; plank (flatwise) = load perpendicular to glueline.

[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:

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

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:

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

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, $K_d = (12/d)^{(1/8)}$ for DF LVL (Mill Number 1055 or 1125) or $K_d = (12/d)^{(1/5)}$ for SP LVL (Mill Number 1125), where d is the LVL depth in inches. For depths less than 3-1/2 inches, multiply the tabulated value by 1.17 for DF LVL or 1.28 for SP LVL. The depth 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) for both DF and SP LVL 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 for both DF and SP LVL shall be adjusted by multiplying the tabulated value by $(4.0/L)^{1/9}$, 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 for both DF and SP LVL is based on the average stress at the proportional limit or 0.04-in. deformation, whichever is less.

[j] Applicable to DF LVL only.

Table 2. Equivalent Specific Gravity for Connection Design[a]

Connection Type	True E LVL Grade	Face[b]		Edge[c]	
		DF LVL	SP LVL	DF LVL	SP LVL
Nails and Wood Screws – Withdrawal	1.4E	0.50	NA	0.47	NA
	1.6E	0.50	0.50	0.47	0.43
	2.1E	0.50	0.50	0.50	0.43
	2.3E	0.50	NA	0.50	NA
	2.4E	0.50	NA	0.50	NA
Nails and Wood Screws – Lateral	1.4E	0.50	NA	0.50	NA
	1.6E	0.50	0.55	0.50	0.49
	2.1E	0.50	0.55	0.50	0.49
	2.3E	0.50	NA	0.50	NA
	2.4E	0.50	NA	0.50	NA
Bolts and Lag Screws – Lateral	1.4E	0.47	NA	NA	NA
	1.6E	0.47	0.55	NA	NA
	2.1E	0.50	0.55	NA	NA
	2.3E	0.50	NA	NA	NA
	2.4E	0.50	NA	NA	NA

[a] Similar to those values provided in the applicable code for solid sawn lumber having a minimum specific gravity shown.
[b] Installed perpendicular to the wide face of the LVL.
[c] Installed parallel to the wide face of the LVL.

Table 3. Allowable Loads for RigidRim DF LVL Rimboard[a]

True E LVL Grade	Thickness (in.)	Lateral Load[b,c,d] (lbf/ft)	Uniform Vertical Load[e] (lbf/ft)	Lateral Resistance for 1/2-inch-dia. Lag Screws[f] (lbf)
1.4E RigidRim	1-1/2	215	4,900	400
	1-3/4	215	5,500	400
	3-1/2	215	9,800	400

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 lbf = 4.448 N, 1 lbf/ft = 14.6 N/m

[a] Maximum allowable rim board depth is 16 inches.
[b] All design values are applicable to the normal load duration (10 years), except for the lateral load, which is based on the short-term load duration (10 minutes). Design values shall be adjusted for other load durations in accordance with the applicable code except that the uniform vertical load is not permitted to be increased for any load durations shorter than the normal load duration (10 years).
[c] Toe-nailed connections are not limited by the 150 lbf/ft lateral load capacity noted for Seismic Design Categories D, E and F in Section 4.1.10 of the 2021 SDPWS and Section 4.1.7 of the 2015 and 2008 SDPWS.
[d] The nailing schedule for sheathing to rim and rim board to sill plate (toe-nailed) is based on 8d box (0.113 inch x 2-1/2 inches) nails at 6 inches on center. Framing connectors may be used to achieve lateral load capacities exceeding the values shown in this table using the equivalent specific gravity values listed in Table 2.
[e] The allowable uniform vertical load is based on the strength of the rim board and may need to be reduced based on the bearing capacity of the supporting wall plate.
[f] Edge distances from the center of the lag screw to the edge of the rim board and deck ledger must be 2 inches or greater. End distances must be 4 inches or greater.

Table 4. Nail Spacing for RigidLam DF and SP LVL[a,b]

Dimension	Orientation	Maximum Nail Size/Type			Minimum Spacing[c,d] (in.)	Minimum End Distance[c] (in.)
		Common Nail	Box Nail	Sinker Nail		
RigidLam DF LVL						
1-1/4-inch to less than 1-1/2-inch-thick	Edge	6d (0.113" x 2")	8d (0.113" x 2-1/2")	6d (0.092" x 1-7/8")	3	1-1/2
		8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	3	2
		12d (0.148" x 3-1/4")	NA[f]	16d (0.148" x 3-1/4")	4	3
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	NA[f]	6	4
	Face	8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	2	(e)
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	16d (0.148" x 3-1/4")	3	(e)
1-1/2-inch and thicker	Edge	6d (0.113" x 2")	8d (0.113" x 2-1/2")	6d (0.092" x 1-7/8")	2	1
		8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	3	2
		12d (0.148" x 3-1/4")	NA[f]	16d (0.148" x 3-1/4")	4	3
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	NA[f]	6	3
	Face	8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	2	(e)
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	16d (0.148" x 3-1/4")	3	(e)
RigidLam SP LVL						
1-1/2-inch to less than 1-3/4-inch thick	Edge	6d (0.113" x 2")	8d (0.113" x 2-1/2")	6d (0.092" x 1-7/8")	3	1-1/2
		8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	4	2
		12d (0.148" x 3-1/4")	NA[f]	16d (0.148" x 3-1/4")	4	3-1/2
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	NA[f]	6	3-1/2
	Face	8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	3	1-1/2
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	16d (0.148" x 3-1/4")	4	1-1/2
1-3/4-inch and thicker	Edge	6d (0.113" x 2")	8d (0.113" x 2-1/2")	6d (0.092" x 1-7/8")	2	1-1/2
		8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	3	2
		12d (0.148" x 3-1/4")	NA[f]	16d (0.148" x 3-1/4")	4	3
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	NA[f]	6	3
	Face	8d (0.131" x 2-1/2")	12d (0.128" x 3-1/4")	10d (0.12" x 2-7/8")	2	1-1/2
		16d (0.162" x 3-1/2")	16d (0.135" x 3-1/2")	16d (0.148" x 3-1/4")	3	1-1/2

For SI: 1 inch = 25.4 mm

[a] Based on the minimum member depth of 3-1/2 inches.
[b] Allowable lateral and withdrawal nail load capacities are as specified in the NDS for lumber having a specific gravity as indicated in Table 2 of this report.
[c] Spacing and end distance apply to a single row of nails.
[d] The minimum allowable edge distance is 1/4 inch.
[e] The minimum end distance shall be sufficient to avoid nail split.
[f] NA = Not applicable.

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.

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