

FRERES Laminated Veneer Lumber
Freres Lumber Co., Inc.

PR-L324

Revised December 6, 2018

Product: Freres 1.6E, 1.55E, and 1.0E LVL
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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 IBC: Sections 104.11 Alternative materials and 2303.1.9 Structural composite lumber
 - 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: Section R104.11 Alternative materials, and R502.1.7, R602.1.4, and R802.1.6 Structural composite lumber
 - 2018 and 2015 ANSI/AWC NDS, National Design Specification for Wood Construction
 - ASTM D5456-14b, D5456-13, and D5456-09 recognized by the 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
 - APA Reports T2018P-14, T2018P-15, T2018P-37, T2018P-38, and T2018P-40, and other qualification data
2. Product description:

Freres 1.6E, 1.55E, and 1.0E LVL are made with Douglas-fir veneers in accordance with the in-plant manufacturing standard approved by APA. Freres 1.6E, 1.55E, and 1.0E LVL are available in thicknesses of 1 inch, widths of 1-1/2 inches to 48 inches, and lengths up to 60 feet.
3. Design properties:

Table 1 lists the Allowable Stress Design properties for Freres LVL. Table 2 lists the equivalent specific gravities for fastener design of Freres LVL. The allowable spans for Freres LVL shall be in accordance with the recommendations provided by the manufacturer.
4. Product installation:

Freres LVL shall be installed in accordance with the recommendations provided by the manufacturer. The minimum fastener spacings shall be in accordance with the recommendations provided by the manufacturer. Permissible details and allowable hole sizes shall be in accordance with the recommendations provided by the manufacturer.
5. Fire-rated assemblies:

The provisions of 2018 and 2015 IBC Section 722 Calculated fire resistance, and 2012 IBC Section 722.6.3 Design of fire-resistant exposed wood members shall be applicable to Freres LVL. Fire-rated assemblies 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.
6. Limitations:
 - a) Freres LVL shall be designed in accordance with the code using the design properties specified in this report.
 - b) Freres LVL is limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.

- c) Freres LVL is produced at the Freres facility in Lyons, Oregon under a quality assurance program audited by APA.
- d) Properties shown in this report are limited to LVL with a thickness of 1 inch.
- e) This report is subject to re-examination in one year.

7. Identification:

Freres LVL described in this report is identified by a label bearing the manufacturer's name and/or trademark, the APA assigned plant number (1122), the LVL grade, the APA logo, the report number PR-L324, and a means of identifying the date of manufacture.

Table 1. Allowable Stress Design Properties for Freres LVL ^(a,b,c)

| Property | | Design Stress (psi) | | |
|---|----------------------|---------------------|-----------|---------|
| | | 1.6E | 1.55E | 1.0E |
| Bending (F_b) ^(d) | Joist ^(e) | 1,900 | 1,700 | 950 |
| | Plank | 3,000 | 2,200 | 1,200 |
| Modulus of Elasticity (E) ^(f) | Joist | 1,600,000 | 1,550,000 | 900,000 |
| | Plank | 1,400,000 | 1,400,000 | 950,000 |
| Horizontal Shear (F_v) | Joist | 255 | 255 | 255 |
| | Plank | 90 | 90 | 40 |
| Compression Perpendicular to Grain ($F_{c\perp}$) | Joist | 750 | 750 | 750 |
| | Plank | 600 | 600 | 600 |
| Tension parallel to grain (F_t) ^(g) | | 1,300 | 950 | 200 |
| Compression parallel ($F_{c\parallel}$) | | 2,400 | 2,100 | 1,750 |

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, are permitted to be adjusted for other load durations as permitted by the code. The design stresses are limited to conditions in which the average moisture content is less than 16 percent at maximum.
- (b) Joist = load parallel to glueline, plank = load perpendicular to glueline.
- (c) The tabulated values are limited to LVL with a thickness of 1 inch.
- (d) Tabulated bending stress (F_b) may be increased by 4 percent when the member qualifies as a repetitive member as defined in the NDS.
- (e) 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 $(12/d)^{1/6}$ as shown in the following table, where d = member depth in inches. For depths less than 3-1/2 inches, the factor for the 3-1/2-inch depth shall be used.

| Depth, d (in.) | 3-1/2 | 5-1/2 | 7-1/4 | 9-1/4 | 9-1/2 | 11-1/4 | 11-7/8 | 14 | 16 | 18 | 24 |
|---------------------|-------|-------|-------|-------|-------|--------|--------|------|------|------|------|
| 1.6E, 1.55E, & 1.0E | 1.23 | 1.14 | 1.09 | 1.04 | 1.04 | 1.01 | 1.00 | 0.97 | 0.95 | 0.93 | 0.89 |

- (f) Apparent modulus of elasticity.
- (g) The tabulated values are based on a reference length of 4 feet. For lengths longer than 4 feet, the allowable tensile stress shall be modified by $(4/L)^{1/7}$, where L = member length in feet. For lengths shorter than 4 feet, use the tabulated value unadjusted.

Table 2. Fastener Design for Freres 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 | |
| 1.6E & 1.55E | 0.42 | 0.41 | 0.41 | 0.60 | 0.42 | 0.63 |
| 1.0E | 0.42 | 0.41 | 0.34 | 0.58 | 0.41 | 0.63 |

Table 3. Allowable Design Properties for Freres LVL Rimboard ^(a,b)

| Grade | Thickness, t (in.) | Lateral Load ^(b,c,d) (lbf/ft) | Vertical Load Capacity | | | | Lateral Resistance for ½-inch-dia. Lag Screws ^(e) (lbf) |
|-------|--------------------|--|------------------------|-------------------------|--------------------|-------------------------|--|
| | | | Uniform (lbf/ft) | | Concentrated (lbf) | | |
| | | | Depth ≤ 16 in. | 16 in. < Depth ≤ 24 in. | Depth ≤ 16 in. | 16 in. < Depth ≤ 24 in. | |
| 1.55E | t ≥ 1¼ | 240 | 5,400 | 4,000 | 3,800 | 3,800 | 500 |
| | t = 1⅞ | 220 | 4,860 | 4,000 | 3,500 | 3,500 | 475 |
| | t = 1 | 190 | 4,000 | 2,500 | 3,500 | 2,000 | 450 |

For **SI**: 1 inch = 25.4 mm, 1 lbf. = 4.45 N, 1 lbf/ft = 14.6 N/m.

- (a) Allowable design loads in the above table cannot be increased for load duration.
- (b) The lateral load capacity is for seismic design and is permitted to be multiplied by 1.4 for wind load applications. For shear loads of normal or permanent load duration as defined by the NDS, the values in the table shall be multiplied by 0.63 or 0.56, respectively.
- (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 4.1.7 of the ANSI/AWC *Seismic Design Provisions for Wind & Seismic* (SDPWS).
- (d) The nailing schedule for sheathing-to-rim and rim-to-sill plate (toe-nailed) is based on minimum 8d box nails (2½ in. x 0.113 in.) at 6 inches on center. Commercial framing connectors fastened to the face of the rim board and wall plates may be used to achieve lateral load capacities exceeding values in this table. Calculations must be based on equivalent specific gravity listed in Table 2, and the nail spacing must be at least 6 inches on center.
- (e) The lag screw shall be inserted with a washer in a lead hole in accordance with the NDS by turning with a wrench, not by driving with a hammer.

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