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ESR-1618

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Reissued 03/2015
This report is subject to renewal 03/2017.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 17 13—LAMINATED VENEER LUMBER

REPORT HOLDER:

SUNDRE FOREST PRODUCTS INC.

POST OFFICE BOX 1737
ROCKY MOUNTAIN HOUSE, ALBERTA T4T 1B3
CANADA

EVALUATION SUBJECT:

WEST FRASER™ LVL LAMINATED VENEER LUMBER



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ICC-ES Evaluation Report

ESR-1618*

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 13—Laminated Veneer Lumber

REPORT HOLDER:

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EVALUATION SUBJECT:
WEST FRASER™ LVL LAMINATED VENEER LUMBER
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2012, 2009, and 2006 *International Building Code*® (IBC)
- 2012, 2009 and 2006 *International Residential Code*® (IRC)

Property evaluated:

Structural

2.0 USES

West Fraser™ LVL Laminated Veneer Lumber (LVL) is used as beams, headers, joists and rafters.

3.0 DESCRIPTION

West Fraser™ LVL is manufactured by laminating lodgepole pine, white spruce, Douglas fir and aspen veneers singularly or in combination. Veneer sheets are stress-graded based on Ultrasonic Propagation Time (UPT) and sorted in accordance with their UPT classifications. Graded veneer sheets are then scarfed or lapped before being sent to the sheet feeder. From the sheet feeder, veneer is sequenced into prescribed lay-ups, with glue applied on the top face of each veneer sheet, with the exception of the top veneer. Adhesive is exterior-grade phenolic resin complying with the requirements of

ASTM D2559. The grain of all veneer is oriented along the length of the billet. The lay-up is then subjected to hot pressing until the adhesive is cured. West Fraser™ LVL members are available in thicknesses from $\frac{3}{4}$ inch (19 mm) to $3\frac{1}{2}$ inches (89 mm), depths of $1\frac{1}{2}$ inches (38 mm) to 48 inches (1219 mm), and lengths up to 80 feet (24.4 m).

4.0 INSTALLATION

Application and installation of West Fraser™ LVL must comply with this report and the applicable code. Drawings, and/or manufacturer's published installation instructions for the erection and installation on each job, must be available on the jobsite during installation.

4.1 Design and Allowable Stresses:

West Fraser™ LVL is designed as solid-sawn lumber in accordance with the applicable code and the *National Design Specification for Wood Construction*® (NDS). Maximum allowable member design values are as noted in Table 1.

4.2 Fasteners:

Maximum allowable connection design values must be determined in accordance with the applicable section of the NDS, using the equivalent specific gravities provided in Table 2. Nails installed perpendicular to the gluelines on the wide face are permitted, with the same spacing, edge, and end distances as specified in the NDS for solid-sawn lumber. Nails installed parallel to the gluelines on the narrow face of material at least $\frac{3}{4}$ inch (19 mm) thick and $3\frac{1}{2}$ inches (89 mm) wide must be spaced a minimum of 4 inches for 10d and 12d common nails, and 3 inches (76 mm) for 8d common nails. Refer to Figure 1 for fastener orientation. Sixteen-penny (16d) common nails must be spaced a minimum of 8 inches (203 mm) when installed parallel to the gluelines on the narrow face of material that is at least $1\frac{1}{2}$ inches (38 mm) thick and $5\frac{1}{4}$ inches (13 mm) wide. 16d nails are not allowed in the narrow edge of the members thinner than $1\frac{1}{2}$ inches.

5.0 CONDITIONS OF USE

The West Fraser™ LVL Laminated Veneer Lumber described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** Drawings and design details verifying compliance with this report must be submitted to the code official for approval. The drawings and calculations must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.

*Revised June 2015

- 5.2 LVL must not be used in applications where it will obtain a moisture content greater than 16 percent.
- 5.3 This report does not contain an evaluation of connectors other than those specifically noted in Section 4.0 of this report.
- 5.4 Cutting, drilling or notching of LVL is beyond the scope of this report.
- 5.5 This report does not evaluate the effect of fire-retardant or preservative treatment on LVL.
- 5.6 The compression edges of all applications of West Fraser™ LVL must be laterally restrained.
- 5.7 West Fraser™ LVL is produced at Rocky Mountain House, Alberta, Canada, under a quality-control program with inspections by APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Structural Wood-based Products (AC47), dated February 2015.

7.0 IDENTIFICATION

West Fraser™ LVL Laminated Veneer Lumber covered by this report must be identified by a stamp bearing the manufacturer's name or the name of the additional listee noted in this report, the product trade name, the grade, the evaluation report number (ESR-1618), the production shift and date of manufacture and the name of the inspection agency (APA—The Engineered Wood Association).

TABLE 1—ALLOWABLE DESIGN PROPERTIES FOR WEST FRASER™ LVL^{3,4,5,6,7}

PROPERTY		DESIGN STRESS (psi)				
		1.3E Grade	1.7E Grade	1.8E Grade	1.9E Grade	2.0E Grade
Bending (F_b) ⁶	Joist	1700 ¹	2750 ¹	3000 ²	3000 ²	3100 ¹
	Plank	1900	2600	3000	3000	3500
Tension parallel to grain (F_t) ³		1300	1950	1950	1950	2100
Longitudinal shear (F_v)	Joist	220	290	290	300	300
Compression parallel (F_c)		1800	2350	2350	2500	3000
Compression perpendicular ($F_{c\perp}$)	Joist	600	700	750	750	750
Modulus of Elasticity (10^6) ⁷ , MOE		1.3	1.7	1.8	1.9	2.0

For SI: 1 psi = 6.89 kPa, 1 inch = 25.4 mm.

¹The tabulated values are based on loads of a normal duration and a reference depth of 12 inches. For depths of 3 1/2 inches and deeper, when loaded edgewise (joist orientation), the allowable bending stress for 1.3E, 1.7E and 2.0E grades must be modified by $(\frac{12}{d})^{0.1111}$ as shown in the following table:

Depth Factor (1.3E, 1.7E, and 2.0E)									
Depth, d (in.)	3 1/2	5 1/2	7 1/4	9 1/2	11 7/8	14	16	18	24
Multiply by	1.15	1.09	1.06	1.03	1.00	0.98	0.97	0.96	0.93

²The tabulated values are based on loads of a normal duration and a reference depth of 12 inches. For depths of 3 1/2 inches and deeper, when loading is edgewise (joist orientation), the allowable bending stress for 1.8E and 1.9E grades must be modified by $(\frac{12}{d})^{0.1361}$ as shown in the following table:

Depth Factor (1.8E and 1.9E)									
Depth (in.)	3 1/2	5 1/2	7 1/4	9 1/2	11 7/8	14	16	18	24
Multiply by	1.18	1.11	1.07	1.03	1.00	0.98	0.96	0.95	0.91

³Tension (F_t) of the 1.3E, 1.7E, 1.8E, 1.9E and 2.0E grades is based on a gauge length of 4 feet. For specimens longer than 4 feet, a length factor of $(4/L)^{1/11}$ must be used to adjust the F_t , where L is the actual length in feet.

⁴Load parallel to glueline is for joist, and perpendicular to glueline is for plank.

⁵Stresses may be adjusted for duration of load in accordance with the applicable code.

⁶Tabulated flexural stress (F_b) may be increased by 4 percent when the member qualifies as a repetitive member as defined in NDS.

⁷Deflection of uniformly loaded simple span beams is calculated as follows:

$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8 WL^2}{Ebd}$$

where:

- Δ = Deflection, in
- W = Uniform load, plf
- L = Span, ft
- b = Beam width, in
- d = Beam depth, in
- E = Modulus of elasticity, psi

TABLE 2—FASTENER DETAILS

FASTENER DESCRIPTION ²		EQUIVALENT SPECIES AND SPECIFIC GRAVITY ¹				
		1.3E Grade	1.7E Grade	1.8E Grade	1.9E Grade	2.0E Grade
Nail Withdrawal						
Face	Installed perpendicular to the wide face	Hem-Fir (0.43)	Hem-Fir (North) (0.46)	Hem-Fir (North) (0.46)	Douglas Fir-Larch (0.50)	Douglas Fir-Larch (0.50)
Edge	Installed perpendicular to the narrow face	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)
Nail Lateral						
Face	Installed perpendicular to the wide face	Hem-Fir (0.43)	Douglas Fir-Larch (0.50)	Douglas Fir-Larch (0.50)	Douglas Fir-Larch (0.50)	Douglas Fir-Larch (0.50)
Edge	Installed perpendicular to the narrow face	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)
Bolt Installed Perpendicular to the Wide Face						
Loaded parallel to grain		Northern Species (0.34)	Hem-fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)
Loaded perpendicular to grain		Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)	Hem-Fir (0.43)

¹Allowable lateral values for nails noted in the applicable code apply to the LVL for conditions and the species noted in the table.

²See Figure 1 for orientation details.

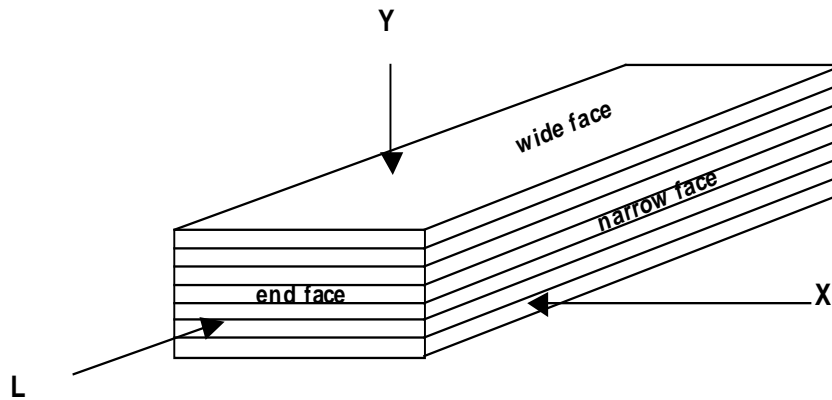


FIGURE 1—WEST FRASER™ LVL FASTENER ORIENTATION