APA PRODUCT REPORT®

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West Fraser Durastrand® LSL & OSL — PR-L260
West Fraser Timber Co. Ltd. — Revised March 17, 2023

Products: West Fraser Durastrand® LSL and OSL
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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, 2015, and 2012 International Residential Code (IRC): Section R104.11 Alternative materials
   - ASTM D5456-18, D5456-14b, D5456-13, and D5456-09 recognized in the 2021 IBC and IRC, 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
   - APA Reports T99Q-22, T2003Q-25, T2006P-59, T2006P-60, T2006P-61, T2006P-62, T2006P-67, T2006P-69, T2006P-91, T2007P-53, T2008P-87, T2008P-88, T2011P-21, T2012P-44, T2018P-08A, T2019P-09, T2019P-23, T2019P-28, T2019P-34, and T2019P-47, and other qualification data and engineering analyses

2. Product description:
   West Fraser Durastrand® LSL and OSL are made with strands of various species and strand classifications in accordance with the in-plant manufacturing standard approved by APA. West Fraser Durastrand 1.7E LSL, 1.5E OSL, and 1.3E OSL are available in thicknesses from 1-3/4 to 5-1/4 inches, widths up to 24 inches, and lengths up to 48 feet. West Fraser Durastrand 1.35E LSL and 0.8E OSL are available in a thickness of 1-1/4 inches, widths up to 24 inches, and lengths up to 24 feet. West Fraser Durastrand 1.55E LSL is available in a thickness of 1-1/2-inches, widths up to 24 inches, and lengths up to 24 feet.

3. Design properties:
   Table 1 lists the design properties, Table 2 lists the equivalent specific gravities for fastener design for West Fraser Durastrand LSL and OSL, Table 3 lists the allowable loads for rim boards, and Table 4 lists the allowable nail spacing. The allowable spans for West Fraser Durastrand LSL and OSL shall be engineered using the information provided in this report.

4. Product installation:
   West Fraser Durastrand LSL and OSL shall be installed in accordance with the engineering drawing approved by the engineer of record. Permissible details and allowable hole sizes shall be in accordance with the engineering drawing. When used as rim boards, West Fraser Durastrand LSL and OSL shall be permitted to be constructed in accordance with the *Rim Board Hole Specifications* provided by APA Design/Construction Guide: *Performance Rated I-Joists*, Form Z725 (www.apawood.org/resource-library).

5. Fire-rated assemblies:
   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 West Fraser Durastrand LSL. Fire-rated assemblies shall be constructed in accordance with the recommendations provided by APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (see link above), and the manufacturer.

6. Limitations:
   a) West Fraser Durastrand LSL and OSL shall be designed in accordance with the applicable code using the design properties specified in this report.
   b) West Fraser Durastrand LSL and OSL are limited to dry service conditions where the average equilibrium moisture content of sawn lumber is less than 16%.
   c) West Fraser Durastrand 1.7E LSL, 1.5E OSL, and 1.3E OSL are produced at West Fraser facility in Grande Prairie, Alberta, and 1.55E LSL, 1.35E LSL, and 0.8E OSL are produced in High Level, Alberta, under a quality assurance program audited by APA.
   d) This report is subject to re-examination in one year.

7. Identification:
   West Fraser Durastrand LSL and OSL described in this report are identified by a label bearing the manufacturer's name and/or trademark (West Fraser), the APA assigned plant number (454 for the Grande Prairie Plant and 1132 for the High Level Plant), the product grade, the APA logo, the report number PR-L260, and a means of identifying the date of manufacture.

Table 1. Design Properties (Allowable Stress Design) for West Fraser Durastrand LSL and OSL[a]

GRADE	SHEAR-FREE (TRUE) E[b] (10^6 psi)	AXIAL (psi)		JOIST/BEAM EDGE LOADING[c] (psi)			PLANK FACE LOADING (psi)		
		F_t[d,e]	F_c	F_b[f,g,h]	F_v	$F_{c\perp}$	F_b[f]	F_v	$F_{c\perp}$
1.7E	1.7	2,050	2,050	2,150	400	1,200	2,800	150	325
1.55E	1.55[i]	1,935	2,175	2,360	525	1,150	2,620	155	545
1.35E	1.35	1,430	1,905	1,850	445	1,150	2,060	150	565
1.5E	1.5	1,775	1,775	1,750	400	1,150	2,550	130	325
1.3E	1.3	1,300	1,300	1,625	350	1,150	2,000	115	285
0.8E	0.8	680	1,100	1,130	345	1,415	-	-	-

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 allowable 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 of sawn lumber is less than 16%.

[b] For uniformly loaded simple-span beams on edge, deflection is calculated as follows:

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

For uniformly loaded simple-span beams on face, deflection is calculated as follows:

$$\delta = \frac{270\omega L^4}{Ebh^3} + \frac{86.0\omega L^2}{Ebh}$$

Where: δ = estimated deflection, inches, ω = uniform load, plf
L = span, feet, E = tabulated modulus of elasticity, psi
b = beam width, inches, and h = beam depth, inches

[c] Joist = load parallel to glueline.

[d] F_t value for 0.8E OSL is applicable to lengths up to 24 feet.

[e] Tabulated values are based on a reference length of 4 feet. For other lengths, the allowable tensile stress shall be modified by $(4/L)^{1/8}$, where L = length in feet. For lengths less than 4 feet, use the allowable tension stresses in Table 1 unadjusted.

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

[g] Edgewise F_b value for 0.8E OSL is applicable to a 16-inch depth or less.

[h] 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 multiplied by $(12/d)^{1/4}$ for 1.7E LSL, 1.5E OSL, and 1.3E OSL, $(12/d)^{1/5}$ for 1.55E LSL and 1.35E LSL, as shown in the following table, and $(12/d)^{1/5}$ for 0.8E OSL manufactured in High Level, Alberta. For depths less than 2-1/2 inches, the factor for the 2-1/2-inch depth shall be used.

Depth (in.)	2-1/2	5-1/2	7-1/4	9-1/4	11-1/4	12	16	18	20	24
Multiply by	1.48	1.22	1.13	1.07	1.02	1.0	0.93	0.90	0.88	0.84

[i] For member depth of 7-1/4 inches or greater. For depths less than 7-1/4 inches, the modulus of elasticity for 1.55E LSL shall be reduced to 1.50 x 10^6 psi.

Table 2. Fastener Design for West Fraser Durastrand LSL and OSL

GRADE	EQUIVALENT SPECIFIC GRAVITY (S.G.)						LATERAL LOAD[a] (pounds)
	NAILS AND WOOD SCREWS				BOLTS AND LAG SCREWS		Lag Screws Installed in Face
	Withdrawal Load		Lateral Load		Lateral Load		
					Installed in Face		
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Parallel to Grain	Perpendicular to Grain	
1.7E	Red pine (0.44)	Mixed southern pine (0.51)	Douglas fir-larch North (0.49)	Red maple (0.61)	Mixed southern pine (0.51)	Red oak (0.66)	400
1.55E and 1.35E	Red pine (0.44)	Mixed southern pine (0.51)	Douglas fir-larch (0.50)	Red maple (0.61)	Mixed southern pine (0.51)	Red oak (0.66)	400
1.5E	Red pine (0.44)	Douglas fir-larch (0.50)	Hem-fir North (0.46)	Mixed maple (0.55)	Douglas fir-larch North (0.49)	Red maple (0.60)	400
1.3E	Red pine (0.44)	Douglas fir-larch North (0.49)	Eastern hemlock (0.41)	Mixed southern pine (0.51)	Englemann spruce-lodgepole pine (0.38)	Southern pine (0.55)	400
0.8E	Northern white cedar (0.32)	Hem-fir (0.43)	-	Douglas fir-larch (0.50)	Northern white cedar (0.32)	Red maple (0.61)	400

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

[a] The lateral capacity is for a 1/2 -inch diameter lag screws installed into the face of LSL and OSL based on 1-1/2-inch-thick spruce-pine-fir side member and 1/2-inch-thick sheathing with a full penetration of the LSL and OSL by the lag bolt.

Table 3. West Fraser Durastrand Allowable Loads for Rim Board Applications

GRADE	Thickness (in.)	VERTICAL LOAD[a]				LATERAL CAPACITY[c,d,e,f,g] (pounds per foot)	
		Uniform[b] (pounds per foot)		Concentrated (pounds)		Nails Spaced at 6 in. o.c.	Nails Spaced at 4 in. o.c.
		Depths ≤ 16 in.	24 in. ≥ Depth > 16 in.	Depth ≤ 16 in.	24 in. ≥ Depth > 16 in.		
1.3E	1-3/4	7,000	4,350	5,200	5,200	240	NA
0.8E	1-1/4	5,400	5,400	4,600	4,600	240	NA

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

[a] The vertical load capacities are based on the normal load duration (10 years), which are not permitted to be increased for any shorter load durations.
[b] The allowable vertical uniform load capacity 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.
[c] The tabulated lateral load capacity is based on the short-term load duration (10 minutes).
[d] Rim boards may be used to substitute for solid-sawn framing in horizontal wood diaphragms as shown in Tables 4.2A and Table 4.2C of the 2021 ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) (for 2021 IBC), 2015 SDPWS (for 2018 and 2015 IBC), and 2008 SDPWS (for 2012 IBC), provided the maximum allowable shear values for the diaphragms are limited to the allowable lateral capacity noted in this table.
[e] Toe-nailed connections are not limited by the 150 lbf/ft allowable 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.
[f] 8d common nails shall be used to connect the floor sheathing to the rim board and to connect the rim board to the sill plate (toe nail). The nails shall be spaced as noted in the table. Two 8d nails are required to connect each floor joist to the sill plate, and two 8d nails are required to connect the rim board to the end of each floor joist.
[g] See Table 4 for minimum nail spacing requirements.

Table 4. Minimum Allowable Nail Spacings for West Fraser Durastrand LSL and OSL

CONNECTOR SIZE	NAILS INSTALLED IN THE NARROW FACE[a]		NAILS INSTALLED IN THE WIDE FACE[c]	
	ON-CENTER SPACING (in.)[b]	END DISTANCE (in.)	ON-CENTER SPACING (in.)	END DISTANCE (in.)
8d box and common nail or smaller	3 (4)	2	1	1/2
10d box and common nail	4 (6)	2	1	1/2
16d box nail	4 (6)	2	1	1/2
16d sinker (12d common) nail	4 (6)	2	1	1/2
16d common nail	5 (7)	2-1/2	1-1/2	7/8

For SI: 1 inch = 25.4 mm

[a] Multiple rows of nails are allowed in the narrow face (edge) of 1-1/2-inch or greater thickness LSL and OSL, with a minimum of 1/2-inch spacing between rows. Rows are to be equal distance from centerline.
[b] The tabulated value is the required minimum spacing for single-row fasteners. The value in the parentheses is the required minimum spacing for multiple-row fasteners.
[c] In general, the minimum on-center spacing permitted for nails installed in the wide face of LSL and OSL is the same as that permitted by the applicable code for solid-sawn lumber.

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