



## **FRERES MASS PLY PANELS (MPP) AND MASS PLY LAMS (MPL) BEAMS AND COLUMNS Freres Lumber Co., Inc.**

**PR-L325**

Revised January 14, 2021

Products: Freres Mass Plywood Panel

Freres Lumber Co., Inc., 40519 Cedar Mill Road, PO Box 276, Lyons, Oregon 97358

(503) 859-2121

[www.frereslumber.com](http://www.frereslumber.com)

1. Basis of the product report:
  - 2018 and 2015 International Building Code (IBC): Section 2303.1.4 Structural glued cross-laminated timber
  - 2012 IBC Sections 104.11 Alternative materials
  - 2018 and 2015 International Residential Code (IRC): Sections R502.1.6, R602.1.6, and R802.1.6 Cross-laminated timber
  - 2012 IRC: Section R104.11 Alternative materials
  - 2018 and 2015 ANSI/AWC NDS, National Design Specification for Wood Construction
  - ANSI/APA 320-2019 Performance Rated Cross-Laminated Timber
  - APA Reports T2018P-21, T2019P-39, T2019P-69, and T2020P-23, and other qualification data
2. Product description:

Freres Mass Ply Panels (MPP) are manufactured with 1-inch-thick nominal Freres 1.6E and 1.0E Douglas-fir LVL recognized in APA Product Report PR-L324 in accordance with custom layups of ANSI/APA PRG 320 through product qualification and mathematical models using principles of engineering mechanics. The LVL layers are parallel-laminated, bonded with approved structural adhesives, and pressed to form a solid panel. The unglued edge joints between the 1-inch-thick LVL pieces within the same MPP layer are staggered between adjacent layers.

Freres MPP is available in the grade of F10 or F16, and can be used in floor, roof and wall applications. Freres MPP is manufactured in a plank billet (see Figure 1) in nominal thicknesses (t) of 2 to 12-1/4 inches, nominal widths (w) of 4, 8, 10, and 12 feet, and lengths up to 48 feet.

Freres Mass Ply Lams (MPL) are rip-cut vertically from MPP and intended primarily for use as beams in the joist (edgewise) orientation or columns in the axial orientation. MPL is not permitted to be rip-cut horizontally from MPP. MPL is available in the grade of F16, F16A, or F10. Freres F16 MPL is available in nominal thicknesses (t) of 2 to 24-1/2 inches, nominal widths (w) of 1 to 48 inches, and lengths up to 80 feet. Freres F16 MPL is ripped from 4-foot wide MPP with no edge joints between any 1-inch layers. Freres F16 MPL is permitted for use in the plank (flatwise) orientation provided that the minimum width (w) is no less than 5-1/8 inches.

Freres F16A MPL is available in nominal thicknesses (t) of 2 to 12-1/4 inches, nominal widths (w) of 1 to 72 inches, and lengths up to 80 feet (see Figure 1). Freres F16A MPL shall be permitted to be ripped from an MPP billet as long as the distance between the edge joint in any 1-inch layers and extreme fiber in tension or compression edge of the MPL is at least 5 inches. Freres F16A MPL is permitted for use in the plank (flatwise) orientation provided that the minimum width (w) is no less than 5-1/8 inches.

Freres F10 MPL is available in nominal thicknesses (t) of 2 to 3 inches, nominal widths up to 48 inches, and lengths up to 48 feet. Freres F10 MPL is ripped from 4-foot wide MPP with no edge joints between any 1-inch layers. Freres F10 MPL is permitted for use in the plank (flatwise) orientation provided that the minimum width (w) is no less than 5-1/8 inches.

3. Design properties:

Table 1 lists the allowable design properties for Freres MPP. Table 2 lists the allowable stress design properties for Freres MPL beams and columns. Allowable spans for Freres MPP and MPL shall be in accordance with manufacturer's recommendations ([www.frereslumber.com/products-and-services/mass-plywood-panel/](http://www.frereslumber.com/products-and-services/mass-plywood-panel/)). Table 3 lists the equivalent specific gravities for fastener design and Table 4 lists the minimum nail spacing for Freres MPP and MPL.

4. Product installation:

Freres MPP shall be installed in accordance with the recommendations provided by the manufacturer (see link above) and the engineering drawing approved by the engineer of record. Permissible details shall be in accordance with the engineering drawing.

5. Fire-rated assemblies:

Fire-rated assemblies using Freres MPP shall be constructed in accordance with the recommendations provided by the manufacturer. Procedures specified in Chapter 16 of the 2018 NDS shall be permitted for use in designing Freres MPP for a fire exposure up to 2 hours.

The provisions specified in the 2018 and 2015 IBC Section 722 Calculated fire resistance, and 2012 IBC Section 722.6.2 Design of fire-resistant exposed wood members shall be applicable to Freres MPL. Fire rated assemblies using Freres MPL shall be constructed in accordance with the recommendations provided by APA Design/Construction Guide: *Fire-Rated Systems, Form 305* ([www.apawood.org/resource-library](http://www.apawood.org/resource-library)), and the manufacturer.

6. Limitations:

- a) Freres MPP and MPL shall be designed in accordance with principles of mechanics using the design properties specified in this report or provided by the manufacturer.
- b) Freres MPP and MPL products shall be limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
- c) Freres MPP and MPL shall be manufactured in accordance with the proprietary Freres MPP and MPL manufacturing specifications documented in the in-plant manufacturing standard approved by APA.
- d) Freres MPP and MPL are produced at the Freres facility in Lyons, Oregon under a quality assurance program audited by APA.
- e) Properties shown in Table 2 are limited to F16 and F16A MPL with nominal thicknesses of 2 to 24-1/2 inches, and F10 MPL with nominal thicknesses of 2 to 3 inches.
- f) The distance between the edge joint in any 1-inch layers and extreme fiber in tension or compression edge of the MPL must be at least 5 inches when installed in the joist (edgewise) orientation.
- g) This report is subject to re-examination in one year.

7. Identification:

Freres MPP and MPL described in this report are identified by a label bearing the manufacturer's name (Freres) and/or trademark, the APA assigned plant number (1121), the product standard (ANSI/APA PRG 320 and/or ASTM D5456), the APA logo, the MPP or MPL grade and thickness, the report number PR-L325, and a means of identifying the date of manufacture.

Table 1. ASD Reference Design Values<sup>(a,b,c)</sup> for Freres MPP (For Use in the U.S.)

MPP Grade	Layup ID	Thickness, $t_p$ (in.)	Major Strength Direction				Minor Strength Direction			
			$(F_bS)_{eff,f,0}$ (lbf-ft/ft)	$(EI)_{eff,f,0}$ ( $10^6$ lbf-in. <sup>2</sup> /ft)	$(GA)_{eff,f,0}$ ( $10^6$ lbf/ft)	$V_{s,0}$ (lbf/ft)	$(F_bS)_{eff,f,90}$ (lbf-ft/ft)	$(EI)_{eff,f,90}$ ( $10^6$ lbf-in. <sup>2</sup> /ft)	$(GA)_{eff,f,90}$ ( $10^6$ lbf/ft)	$V_{s,90}$ (lbf/ft)
F16	F16-2	2-1/16	1,110	16	0.82	2,190	210	2.8	0.17	695
	F16-3	3-1/16	1,870	51	1.23	2,190	355	9.0	0.26	695
	F16-4	4-1/16	3,325	122	1.64	2,925	630	21	0.34	930
	F16-5	5-1/8	5,200	238	2.05	3,650	985	42	0.43	1,160
	F16-6	6-1/8	7,500	410	2.46	4,375	1,420	72	0.69	1,390
	F16-7	7-1/8	10,200	652	2.66	5,100	1,930	114	0.81	1,630
	F16-8	8-3/16	13,325	973	3.04	5,825	2,525	170	0.91	1,860
	F16-9	9-3/16	16,850	1,385	3.42	6,575	3,200	242	1.04	2,090
	F16-10	10-3/16	20,825	1,900	3.80	7,300	3,950	333	1.15	2,320
	F16-11	11-1/4	25,175	2,529	4.18	8,025	4,775	443	1.27	2,550
	F16-12	12-1/4	29,975	3,283	4.56	8,750	5,675	575	1.38	2,775
	F10	F10-2	2-1/16	670	7.3	0.38	1,280	615	4.9	0.28
F10-3		3-1/16	1,510	25	0.58	1,530	690	18	0.41	980
F10-4		4-1/16	2,675	58	0.77	2,030	1,230	42	0.55	1,310
F10-5		5-1/8	4,200	114	0.96	2,550	1,910	82	0.69	1,640
F10-6		6-1/8	6,050	197	1.15	3,050	2,750	141	0.83	1,960
F10-7		7-1/8	8,225	312	1.34	3,550	3,750	224	0.97	2,290
F10-8		8-3/16	10,750	466	1.54	4,075	4,900	334	1.10	2,625
F10-9		9-3/16	13,600	664	1.73	4,575	6,200	476	1.24	2,950
F10-10		10-3/16	16,775	910	1.92	5,075	7,650	653	1.38	3,275
F10-11		11-1/4	20,300	1,212	2.11	5,600	9,275	870	1.52	3,600
F10-12		12-1/4	24,175	1,573	2.30	6,100	11,025	1,129	1.66	3,925

For SI: 1 in. = 25.4 mm; 1 ft = 304.8 mm; 1 lbf = 4.448N

- <sup>(a)</sup> Tabulated values are allowable design values.
- <sup>(b)</sup> Tabulated values are limited to F16 and F10 MPP manufactured with 1-inch-thick Freres 1.6E and 1.0E Douglas-fir LVL, respectively, as recognized in APA Product Report PR-L324.
- <sup>(c)</sup> Deflection under a specified uniformly distributed load,  $w$ , acting perpendicular to the face of a single-span panel may be calculated as a sum of the deflections due to moment and shear effects using the effective bending stiffness,  $(EI)_{eff}$ , and the effective in-plane (planar) shear rigidity,  $(GA)_{eff}$ , as follows:

$$\delta = \frac{22.5wL^4}{(EI)_{eff}} + \frac{3wL^2}{2(GA)_{eff}} \quad [1]$$

where:  $\delta$  = estimated deflection, inches;  $w$  = uniform load, plf;  
 $L$  = span, feet;  $(EI)_{eff}$  = tabulated effective bending stiffness,  $10^6$  lbf-in.<sup>2</sup>/ft; and



Table 2 – Allowable Stress Design Properties for Freres MPL <sup>(a,b)</sup>

Property		Design Stress (psi)	
		F16A and F16	F10
Bending ( $F_b$ ) <sup>(c)</sup>	Joist <sup>(d)</sup>	1,900	950
	Plank	1,250 <sup>(g)</sup>	965
Modulus of Elasticity ( $E$ ) <sup>(e)</sup>	Joist	1,600,000	900,000
	Plank	1,400,000	850,000
Horizontal Shear ( $F_v$ )	Joist	255 <sup>(h)</sup>	255
	Plank	90 <sup>(i)</sup>	40
Compression Perpendicular to Grain ( $F_{c\perp}$ )	Joist	750	750
	Plank	500	500
Tension parallel to grain ( $F_t$ ) <sup>(f)</sup>		1,300	200
Compression Parallel to grain ( $F_{c\parallel}$ )		2,400	1,750

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

- (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 dry-use conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
- (b) Joist = load parallel to glueline, plank = load perpendicular to glueline (see Figure 1 for available thicknesses).
- (c) The tabulated bending stress ( $F_b$ ) may be increased by 4 percent when the member qualifies as a repetitive member as defined in the NDS.
- (d) 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  $(12/d)^{1/6}$ , 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.
- (e) Apparent modulus of elasticity.
- (f) 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.
- (g) The tabulated value can be increased to 1,650 psi for 2 inches in thickness
- (h) The tabulated value for F16A shall be multiplied by 0.3 for 3-ply members, 0.4 for all other odd-ply members, and 0.5 for all even-ply members.
- (i) For beams equal to or greater than 6 inches in depth, the tabulated value shall be reduced to 55 psi.

Table 3. Equivalent Specific Gravity for Fastener Design of Freres MPP and MPL

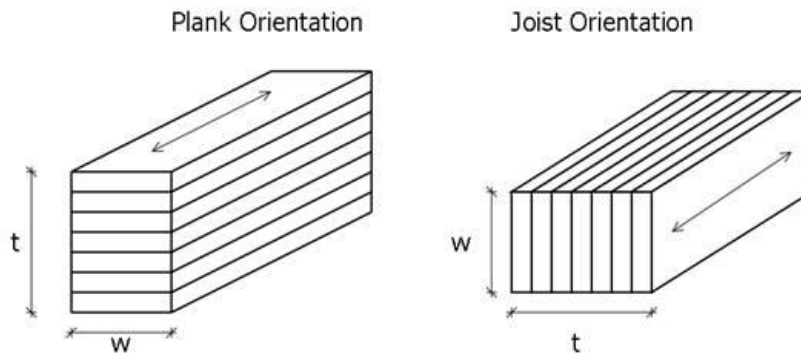
Grade	Equivalent Specific Gravity (ESG)					
	Nails				Bolts	
	Withdrawal Load		Lateral Load		Lateral Load	
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Installed in Face	
					Parallel to Grain	Perpendicular to Grain
F16A and F16	0.42	0.41	0.41	0.60	0.42	0.63
F10	0.42	0.41	0.34	0.58	0.41	0.63

Table 4. Minimum Allowable Nail Spacings for Freres MPP and MPL (a,b)

Orientation	Common Nail Size(c,d)	Minimum End Distance (in.)	Minimum Nail Spacing (in.)	
			Single Row	Multiple Rows
Edge(e)	12d (0.148 in. x 3-1/4 in.) & smaller	1-1/2	3	NR(g)
	16d (0.162 in. x 3-1/2 in.)	NR(g)		
Face(f)	16d (0.162 in. x 3-1/2 in.) & smaller	1	2	2

For SI: 1 inch = 25.4 mm.

- (a) Edge distance shall be sufficient to prevent splitting.
- (b) The tabulated values are limited to MPP and MPL with a thickness of 1 inch or thicker.
- (c) 16d sinkers (0.148 in. x 3-1/4 in.) may be spaced the same as a 12d common wire nail (0.148 in. x 3-1/4 in.).
- (d) Nails listed are common wire nails. For box nails, the spacing and end distance requirements of the next shorter common nails may be used: e.g., a 16d box (0.135 in. x 3-1/2 in.) nail may be spaced the same as a 12d common (0.148 in. x 3-1/4 in.) nail. Fastener sizes and closest on-center spacing not specifically described above are beyond the scope of this report.
- (e) Nail penetration for edge nailing shall not exceed 2-1/2 inches for 12d common nails (0.148 in. x 3-1/4 in.) and 2-1/4 inches for 8d common nails (0.131 in. x 2-1/2 in.).
- (f) Tabulated closest on-center spacing for face orientation is applicable to nails that are installed in rows parallel to the grain (length) of the MPP and MPL. For nails installed in rows perpendicular to the direction of grain (width/depth) of the MPP and MPL, the closest on-center spacing for face orientation shall be sufficient to prevent splitting of the MPP and MPL.
- (g) Not recommended.



Plies	2	3	4	5	6	7	8	9	10	11	12	
Fractional Nominal (in.)	2 1/16	3 1/16	4 1/16	5 1/8	6 1/8	7 1/8	8 3/16	9 3/16	10 3/16	11 6/25	12 1/4	
Decimal Nominal (in.)	2.04	3.06	4.08	5.10	6.12	7.14	8.16	9.18	10.20	11.22	12.24	
Plies	13	14	15	16	17	18	19	20	21	22	23	24
Fractional Nominal (in.)	13 1/4	14 1/4	15 5/16	16 5/16	17 3/8	18 3/8	19 3/8	20 3/8	21 7/16	22 7/16	23 1/2	24 1/2
Decimal Nominal (in.)	13.26	14.28	15.30	16.32	17.34	18.36	19.38	20.40	21.42	22.44	23.46	24.48

Legends:   Thickness available for F10, F16, and F16A;   Thickness available for F16 and F16A;   Thickness available for F16

Figure 1. Freres MPP and MPL Orientations and Thicknesses

*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, and Validation Entity by the State of Florida, and an approved testing laboratory by City of Los Angeles.

**APA – THE ENGINEERED WOOD ASSOCIATION  
HEADQUARTERS**

7011 So. 19<sup>th</sup> St. ▪ Tacoma, Washington 98466  
Phone: (253) 565-6600 ▪ Fax: (253) 565-7265 ▪ Internet Address: [www.apawood.org](http://www.apawood.org)

**PRODUCT SUPPORT HELP DESK**  
(253) 620-7400 ▪ *E-mail Address:* help@apawood.org

**DISCLAIMER**

APA Product Report® is a trademark of *APA – The Engineered Wood Association*, Tacoma, Washington. The information contained herein is based on the product evaluation in accordance with the references noted in this report. Neither APA, nor its members make any warranty, expressed or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report. Consult your local jurisdiction or design professional to assure compliance with code, construction, and performance requirements. Because APA has no control over quality of workmanship or the conditions under which engineered wood products are used, it cannot accept responsibility for product performance or designs as actually constructed.