

20F and 16F Glulam Beams
Arizona Structural Laminators, LLC

PR-L271
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Products: 20F and 16F Glulam Beams

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1. Basis of the product report:
 - 2009 and 2006 International Building Code (IBC): Sections 104.11 Alternative Materials and 2303.1.3 Structural glued-laminated timber
 - 2009 and 2006 International Residential Code (IRC): Sections R104.11 Alternative Materials, and R502.1.5, R602.1.2 and R802.1.4 Structural glued-laminated timber
 - ASTM D 3737-07 and D 3737-03 recognized by the 2009 IBC and IRC, and 2006 IBC and IRC, respectively
 - ANSI/AITC A190.1-07 and A190.1-02 recognized by the 2009 IBC and IRC, and 2006 IBC and IRC, respectively
 - Full-scale glulam beam test data and model analysis
2. Product description:

Arizona Structural Laminators 20F-E/SP1, 20F-E8/DFS&PP, and 16F-E8/PP glulam beams are used as beams, headers, rafters, or purlins, and are manufactured in accordance with manufacturing specifications approved by APA. The glulam beams are manufactured in accordance with Arizona Structural Laminators' in-plant manufacturing standard approved by APA. The adhesives used to manufacture the glulam beams are exterior-type adhesives meeting the requirements of ASTM D 2559.
3. Design properties:

Table 1 lists the design properties for Arizona Structural Laminators 20F and 16F glulam beams. The allowable loads for Arizona Structural Laminators 20F and 16F glulam beams shall be determined based on the design properties listed in Table 1.
4. Product installation:

Arizona Structural Laminators 20F and 16F glulam beams shall be installed in accordance with the recommendations provided by the manufacturer and EWS Technical Note: *Glulam Connection Details*, Form T300 (www.apawood.org/publications). Permissible field notching and drilling shall be in accordance with the recommendations provided by the manufacturer and with EWS Technical Note: *Field Notching and Drilling of Glued Laminated Timber Beams*, Form S560 (www.apawood.org/publications).
5. Fire-rated assemblies:

Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer and with APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (www.apawood.org/publications). For one- or two-hour rated glulam beams, Arizona Structural Laminators 20F and 16F glulam beams shall be constructed in accordance with ANSI/AITC A190.1 and designed in accordance with the recommendations provided by the manufacturer and with EWS Technical Note: *Calculating Fire Resistance of Glulam Beams and Columns*, Form Y245 (www.apawood.org/publications).
6. Limitations:
 - a) Arizona Structural Laminators 20F and 16F glulam beams recognized in this report shall be designed in accordance with the code using the design properties specified in this report.

- b) Arizona Structural Laminators 20F and 16F glulam beams shall have a minimum depth of four laminations with the exception of 20F-E/SP1, which shall have a minimum depth of three laminations.
- c) Arizona Structural Laminators 20F and 16F glulam beams are produced at Arizona Structural Laminators' facility in Eagar, Arizona, under a quality assurance program audited by APA.
- d) This report is subject to re-examination in one year.

7. Identification:

Arizona Structural Laminators 20F and 16F glulam beams described in this report are identified by a label bearing the manufacturer's name (Arizona Structural Laminators) and/or trademark, the APA assigned plant number (1084), the product standard (ANSI/AITC A190.1), the APA logo, the layup combination symbol, the report number PR-L271, and a means of identifying the date of manufacture.

Table 1. Design Values for Arizona Structural Laminators 20F and 16F Glulam Beams for Normal Duration of Load ⁽¹⁾

Symbol	Species ⁽²⁾ Outer/Core	Bending About X-X Axis (Loaded Perpendicular to Wide Faces of Laminations)						Bending About Y-Y Axis (Loaded Parallel to Wide Faces of Laminations)				Axially Loaded			Fasteners	
		Extreme Fiber in Bending ⁽³⁾		Compression Perpendicular to Grain		Shear Parallel to Grain ⁽⁴⁾	Modulus of Elasticity ⁽⁵⁾	Extreme Fiber in Bending ⁽⁶⁾	Compr. Perpendicular to Grain	Shear Parallel to Grain ⁽⁴⁾	Modulus of Elasticity ⁽⁵⁾	Tension Parallel to Grain	Compr. Parallel to Grain	Modulus of Elasticity	Specific Gravity for Dowel-Type Fastener Design	
		Tension Zone Stressed in Tension	Compr. Zone Stressed in Tension	Tension Face	Compr. Face										Top or Bottom Face	Side Face
		F_{bx}^+ (psi)	F_{bx}^- (psi)	F_{cLx} (psi)		F_{vx} (psi)	E_x (10^3 psi)	F_{by} (psi)	F_{cLy} (psi)	F_{vy} (psi)	E_y (10^3 psi)	F_t (psi)	F_c (psi)	E_{axial} (10^3 psi)	SG	
20F-E/SP1	SP/PP	2000	1450	805	375	210	1.6	950	375	190	1.3	900	1000	1.4	0.43 ⁽⁷⁾	0.43
20F-E8	DFS/PP	2000	1000	590	375	210	1.6	1300	375	190	1.4	900	1150	1.4	0.43 ⁽⁸⁾	0.43
16F-E8	PP/PP	1600	800	375	375	210	1.4	1250	375	185	1.3	780	1150	1.3	0.43	0.43
Wet-use factor		0.8		0.53		0.875	0.833	0.8	0.53	0.875	0.833	0.8	0.73	0.833	see NDS	

Footnotes to Table:

1. The tabulated design values are for normal duration of loading. For other durations of loading, see the applicable building code. The tabulated design values are for dry conditions of use. For wet conditions of use, multiply the tabulated values by the factors shown at the bottom of the table.
2. SP = Southern pine; DFS = Douglas fir-South; PP = Ponderosa pine.
3. The values of F_{bx} are based on members 5-1/8 inches in width by 12 inches in depth by 21 feet in length. For members with a larger volume, F_{bx} shall be multiplied by a volume factor, C_v , determined in accordance with applicable building code using 1/20 as the exponent. The beam depths are limited to three or more laminations.
4. For non-prismatic members, members subject to impact or cyclic loading, or shear design of bending members at connections, the F_{vx} and F_{vy} values shall be multiplied by a factor of 0.72.
5. The tabulated E_x and E_y values already include a 5% shear deflection (also known as "apparent E"). For beam stability and column stability calculations, E_{min} shall be determined by multiplying the tabulated modulus of elasticity by 0.528.
6. The values of F_{by} are based on members 12 inches in depth. For depths other than 12 inches, F_{by} shall be permitted to be increased by multiplying by the size factor, $(12/d)^{10}$, where d is the beam depth in inches. When d is less than 3 inches, use the size adjustment factor for 3 inches.
7. The bottom face is a southern pine lamination and shall be permitted to have a specific gravity of 0.55.
8. The bottom face is a Douglas fir-South lamination and shall be permitted to have a specific gravity of 0.46.

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