APA PRODUCT REPORT®

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Kalesnikoff Structural Glued Laminated Timber PR-L333
Kalesnikoff Mass Timber Inc. Revised August 30, 2022

Products: Kalesnikoff Structural Glued Laminated Timber
Kalesnikoff Mass Timber Inc., PO Box 3000 BC-3A, Castlegar, British Columbia, Canada V1N 4N1
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1. Basis of the product report:
   - 2021, 2018, 2015, and 2012 International Building Code (IBC): Section 2303.1.3 Structural glued laminated timber
   - 2021, 2018, and 2015 International Residential Code (IRC): Sections R502.1.3, R602.1.3, and R802.1.2 Structural glued laminated timber
   - 2012 IRC: Sections R502.1.5, R602.1.2, and R802.1.4 Structural glued laminated timber
   - ANSI 117-2020 and ANSI 117-2015 recognized in the 2021 IBC and IRC, and 2018 IBC and IRC, respectively
   - ANSI A190.1-2022 Product Standard for Structural Glued Laminated Timber
   - ANSI A190.1-2017, ANSI A190.1-2012, and ANSI/AITC A190.1-2007 recognized in the 2021 and 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
   - ASTM D3737-18e1, D3737-12, and D3737-08 recognized in the 2021 IBC and IRC, 2018 and 2015 IBC and IRC, and 2012 IBC and IRC, respectively
   - Qualification test data

2. Product description:
   Kalesnikoff glulam products are manufactured with Douglas fir-Larch, Hem-fir, Softwood Species, and Spruce-pine-fir lumber in accordance with ANSI A190.1. These layup combinations are recognized in ANSI 117. Kalesnikoff glulam products are used as beams, headers, rafters, purlins, and columns, and are manufactured in nominal widths up to 32-1/4 inches, depths up to 49-1/2 inches, and lengths up to 60 feet.

3. Design properties:
   Allowable design properties for Kalesnikoff glulam beams and columns are listed in Tables 1 and 2. The allowable spans for Kalesnikoff glulam beams shall be in accordance with the recommendations provided by the manufacturer and APA Data File: *Glued Laminated Beam Design Tables*, Form S475 (www.apawood.org/resource-library), as applicable, or shall be determined based on the design properties listed in Table 1, as appropriate. The allowable loads for Kalesnikoff glulam columns shall be in accordance with the recommendations provided by the manufacturer and APA Data File: *Design of Structural Glued Laminated Timber Columns*, Form Y240 (see link above), as applicable, or shall be determined based on the design properties listed in Table 2, as appropriate.

4. Product installation:
   Kalesnikoff glulam beams and columns shall be installed in accordance with the recommendations provided by the manufacturer and APA Construction Guide*: Glulam Connection Details*, Form T300 (see link above). Permissible field notching and drilling shall be in accordance with the recommendations provided by the manufacturer and APA Technical Note*: Field Notching and Drilling of Glued Laminated Timber Beams*, Form S560 (see link above).

5. Fire-rated assemblies:
   Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer and APA Design/Construction Guide*: Fire-Rated Systems*, Form W305 (see link above). For one- or two-hour rated glulam beams, the Kalesnikoff glulam products shall be manufactured in accordance with ANSI A190.1 and designed in accordance with the recommendations provided by the manufacturer and APA Technical Note*: Calculating Fire Resistance of Glulam Beams and Columns*, Form Y245 (see link above) or Chapter 16 of the National Design Specification for Wood Construction (NDS).

6. Limitations:
   a) Kalesnikoff glulam beams and columns listed in this report shall be designed in accordance with the code using the design properties specified in this report.
   b) Kalesnikoff glulam beams shall meet the dimensions specified in ANSI 117 and ANSI A190.1.
   c) Kalesnikoff glulam beams and columns listed in this report are produced at the Kalesnikoff Mass Timber's facility in South Slocan, British Columbia, under a quality assurance program audited by APA.
   d) This report is subject to re-examination in one year.

7. Identification:
   Kalesnikoff glulam beams and columns listed in this report are identified by a label bearing the manufacturer's name (Kalesnikoff Mass Timber) and/or trademark, the APA assigned plant number (1134), the product standard (ANSI A190.1), the APA logo, the combination symbol, the report number PR-L333, and a means of identifying the date of manufacture.

Table 1. Allowable Design Values for Kalesnikoff Mass Timber Glulam Beams for Normal Duration of Load[1,2]

Symbol	Species Outer/ Core[3] (Bal or Unbal[4])	**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[5]		Compression Perpendicular to Grain		Shear Parallel to Grain[6]	Modulus of Elasticity[7]			Extreme Fiber in Bending[8]	Comp. Perpen -dicular to Grain	Shear Parallel to Grain[6]	Modulus of Elasticity[7]			Tension Parallel to Grain	Comp. Parallel to Grain	Specific Gravity for Dowel-Type Fastener Design	
		Bottom of Beam Stressed in Tension (Positive Bending)	Top of Beam Stressed in Tension (Negative Bending)	Ten. Face	Comp. Face		True	App- arent	Beam Stabi- lity				True	App- arent	Beam Stabi- lity			Top or Bottom Face	Side Face
		F_{bx}^+ (psi)	F_{bx}^- (psi)	$F_{c\perp x}$ (psi)		F_{vx} (psi)	$E_{x\ true}$ (10^6 psi)	$E_{x\ app}$ (10^6 psi)	$E_{x\ min}$ (10^6 psi)	F_{by} (psi)	$F_{c\perp y}$ (psi)	F_{vy} (psi)	$E_{y\ true}$ (10^6 psi)	$E_{y\ app}$ (10^6 psi)	$E_{y\ min}$ (10^6 psi)	F_t (psi)	F_c (psi)	SG	
16F-E2	HF/HF (U)	1,600	1,050	375	375	215	1.5	1.4	0.74	1,200	375	190	1.4	1.3	0.69	825	1,150	0.43	0.43
16F-E7	HF/HF (B)	1,600	1,600	375	375	215	1.5	1.4	0.74	1,350	375	190	1.4	1.3	0.74	875	1,250	0.43	0.43
20F-E2	HF/HF (U)	2,000	1,400	500	500	215	1.7	1.6	0.85	1,200	375	190	1.5	1.4	0.74	925	1,350	0.43	0.43
20F-E7	HF/HF (B)	2,000	2,000	500	500	215	1.7	1.6	0.85	1,450	375	190	1.5	1.4	0.74	1,050	1,450	0.43	0.43
20F-E/SPF1[9]	SPF/SPF (B)	2,000	2,000	425	425	215	1.6	1.5	0.79	875	425	190	1.5	1.4	0.74	425	1,100	0.42	0.42
24F-E/SPF1	SPF/SPF (B)	2,400	2,400	560	560	215	1.7	1.6	0.85	1,150	470	190	1.7	1.6	0.85	1,150	2,000	0.42	0.42
24F-E/SPF3	SPF/SPF (U)	2,400	1,550	560	650	215	1.7	1.6	0.85	1,200	470	195	1.6	1.5	0.79	900	1,750	0.42	0.42
24F-V4	DF/DF (U)	2,400	1,850	650	650	265	1.9	1.8	0.95	1,450	560	230	1.7	1.6	0.85	1,100	1,650	0.50	0.50
24F-V8	DF/DF (B)	2,400	2,400	650	650	265	1.9	1.8	0.95	1,550	560	230	1.7	1.6	0.85	1,100	1,650	0.50	0.50
24F-E13	DF/DF (B)	2,400	2,400	650	650	265	1.9	1.8	0.95	1,750	560	230	1.8	1.7	0.90	1,250	1,700	0.50	0.50
24F-E18	DF/DF (B)	2,400	2,400	650	650	265	1.9	1.8	0.95	1,550	560	230	1.8	1.7	0.90	975	1,700	0.50	0.50
26F-V1	DF/DF (U)	2,600	1,950	650	650	265	2.1	2.0	1.06	1,850	560	230	1.9	1.8	0.95	1,350	1,850	0.50	0.50
26F-V2	DF/DF (B)	2,600	2,600	650	650	265	2.1	2.0	1.06	1,850	560	230	1.9	1.8	0.95	1,350	1,850	0.50	0.50
Wet-use factor		0.8		0.53		0.875	0.833			0.8	0.53	0.875	0.833			0.8	0.73	see NDS	

(1) The combinations in this table are applicable to members consisting of 4 or more laminations and are intended primarily for members stressed in bending due to loads applied perpendicular to the wide faces of the laminations. Allowable design values are tabulated, however, for loading both perpendicular and parallel to the wide faces of the laminations.

(2) The tabulated allowable design values are for normal duration of loading. For other durations of loading, see the applicable building code. The tabulated allowable design values are for dry conditions of use. For wet conditions of use, multiply the tabulated values by the wet-use factors shown at the bottom of the table.

(3) DF = Douglas fir-Larch, HF = Hem-fir, and SPF = Spruce-pine-fir.

(4) The unbalanced (U) layup is intended primarily for simple-span applications and the balanced (B) layup is intended primarily for continuous or cantilevered applications.

(5) 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, $C_v = (5.125/b)^{1/10}\ (12/d)^{1/10}\ (21/L)^{1/10}$, where b is the beam width (in.), d is the beam depth (in.), and L is the beam length between the points of zero moment (ft).

(6) For non-prismatic members, members subject to impact or cyclic loading, or shear design of bending members at connections (NDS 3.4.3.3), the F_{vx} and F_{vy} values shall be multiplied by a factor of 0.72. The tabulated F_{vy} values are for timbers with laminations made from a single piece of lumber across the width or multiple pieces that have been edge bonded. For timber manufactured from multiple piece laminations (across width) that are not edge bonded, value shall be multiplied by 0.4 for members with 5, 7, or 9 laminations or by 0.5 for all other members.

(7) The tabulated E values include true E (also known as "shear-free E"), apparent E, and E for beam stability calculation (NDS 3.3.3.8). For calculating beam deflections, the tabulated E_{app} values shall be used unless the shear deflection is determined in addition to bending deflection based on the tabulated E_{true}. The axial modulus of elasticity, E_{axial} and $E_{axial\ min}$, shall be equal to the tabulated $E_{y\ true}$ and $E_{y\ min}$ values.

(8) The values of F_{by} are based on members 12 inches in depth. For depths less than 12 inches, F_{by} shall be permitted to be increased by multiplying by the flat use factor, $(12/d)^{1/9}$, where d is the beam depth in inches. When d is less than 3 inches, use the size adjustment factor for 3 inches.

(9) 20F-E/SPF1 is limited to 1-1/2 to 3-1/2 inches in width, and 7-1/2, 9, 9-1/2, 11-7/8, and 14 inches in depth.

Table 2. Allowable Design Values for Kalesnikoff Mass Timber Glulam Columns for Normal Duration of Load(1)

Combination Symbol	Species(2)	Grade	All Loading				Axially Loaded			Bending about Y-Y Axis				Bending about X-X Axis		Fasteners
			Modulus of Elasticity(3)			Compression Perpendicular to Grain	Tension Parallel to Grain	Compression Parallel to Grain		Loaded Parallel to Wide Faces of Laminations				Loaded Perpendicular to Wide Faces of Laminations		Specific Gravity for Dowel-Type Fastener Design
										Bending(4)			Shear Parallel to Grain(5,6)	Bending(7)	Shear Parallel to Grain(5)	
							2 or More Lams	4 or More Lams	2 or 3 Lams	4 or More Lams	3 Lams	2 Lams		2 Lams to 15 in. Deep(8)		
			$E_{x\,true}$, $E_{y\,true}$ or E_{axial} (10^6 psi)	$E_{x\,app}$ or $E_{y\,app}$ (10^6 psi)	$E_{x\,min}$, $E_{y\,min}$ or $E_{axial\,min}$ (10^6 psi)	$F_{c\perp}$ (psi)	F_t (psi)	F_c (psi)	F_c (psi)	F_{by} (psi)	F_{by} (psi)	F_{by} (psi)	F_{vy} (psi)	F_{bx} (psi)	F_{vx} (psi)	SG
1	DF	L3	1.6	1.5	0.79	560	950	1,550	1,250	1,450	1,250	1,000	230	1,250	265	0.50
2	DF	L2	1.7	1.6	0.85	560	1,250	1,950	1,600	1,800	1,600	1,300	230	1,700	265	0.50
3	DF	L2D	2.0	1.9	1.00	650	1,450	2,300	1,900	2,100	1,850	1,550	230	2,000	265	0.50
4	DF	L1CL	2.0	1.9	1.00	590	1,400	2,100	1,950	2,200	2,000	1,650	230	2,100	265	0.50
5	DF	L1	2.1	2.0	1.06	650	1,650	2,400	2,100	2,400	2,100	1,800	230	2,200	265	0.50
14	HF	L3	1.4	1.3	0.69	375	800	1,100	1,050	1,200	1,050	850	190	1,100	215	0.43
15	HF	L2	1.5	1.4	0.74	375	1,050	1,350	1,350	1,500	1,350	1,100	190	1,450	215	0.43
16	HF	L1	1.7	1.6	0.85	375	1,200	1,500	1,500	1,750	1,550	1,300	190	1,600	215	0.43
22(9)	SW	L3	1.1	1.0	0.53	315	525	850	725	800	700	575	170	725	195	0.35
Wet-use factors			0.833			0.53	0.8	0.73		0.8			0.875	0.8	0.875	see NDS

(1) The tabulated allowable design values are for normal duration of loading. For other durations of loading, see applicable building code. The tabulated allowable 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) DF = Douglas fir-Larch and SW = Softwood Species.

(3) The tabulated E values include shear-free (true) modulus of elasticity ($E_{x\,true}$, $E_{y\,true}$, and E_{axial}), apparent modulus of elasticity ($E_{x\,app}$ and $E_{y\,app}$), and 5th percentile modulus of elasticity ($E_{x\,min}$, $E_{y\,min}$, and $E_{axial\,min}$). For column stability calculation (NDS 3.7.1), $E_{axial\,min}$ shall be used. For calculating the total deflection due to bending, the tabulated $E_{x\,app}$ or $E_{y\,app}$ values shall be used, or as an alternative, the true (shear-free) bending deflection shall be calculated using the tabulated $E_{x\,true}$ or $E_{y\,true}$, which shall be added to the calculated shear deflection to determine the total deflection due to bending.

(4) The values of F_{by} are based on members 12 inches in depth. For depths less than 12 inches, F_{by} shall be permitted to be increased by multiplying by the flat use factor, $(12/d)^{1/9}$, where d is the beam depth in inches. When d is less than 3 inches, use the size adjustment factor for 3 inches.

(5) For non-prismatic members, notched members, members subject to impact or cyclic loading, or shear design of bending members at connections (NDS 3.4.3.3), the tabulated F_{vx} and F_{vy} values shall be multiplied by 0.72.

(6) The tabulated F_{vy} values are for members of 4 or more lams. The tabulated F_{vy} values shall be multiplied by a factor of 0.95 for 3 lams and 0.84 for 2 lams. For members with 5, 7, or 9 lams manufactured from multiple-piece lams with unbonded edge joints, the tabulated F_{vy} values shall be multiplied by a factor of 0.4. For all other members manufactured from multiple-piece lams with unbonded edge joints, the tabulated F_{vy} values shall be multiplied by a factor of 0.5. This adjustment shall be cumulative with the adjustment specified in Footnote 5.

(7) 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, $C_v = (5.125/b)^{1/10}\,(12/d)^{1/10}\,(21/L)^{1/10}$, where b is the beam width (in.), d is the beam depth (in.), and L is the beam length between the points of zero moment (ft).

(8) The tabulated F_{bx} values are for members without special tension lams up to 15 inches in depth. If the member depth is greater than 15 inches without special tension lams, the tabulated F_{bx} values must be multiplied by a factor of 0.88. If special tension lams are used, the tabulated F_{bx} values are permitted to be increased by a factor of 1.18 regardless of the member depth provided that the increased F_{bx} value does not exceed 2,400 psi. This factor shall be cumulative with the volume factor, C_v, specified in Footnote 7.

(9) When Western Cedars, Western Cedars (North), Western Woods, and Redwood are used in combinations for Softwood Species (SW), the design value for modulus of elasticity shall be reduced by 100,000 psi. When Coast Sitka Spruce, Coast Species, Western White Pine, and Eastern White Pine are used in combinations for Softwood Species (SW) tabulated design values for shear parallel to grain, F_{vx} and F_{vy}, shall be reduced by 10 psi, before applying any other adjustments.

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