

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION: 06—WOOD AND PLASTICS
Section: 06051—Design Information

REPORT HOLDER:

APA—THE ENGINEERED WOOD ASSOCIATION
7011 SOUTH 19th STREET
TACOMA, WASHINGTON 98466
www.apawood.org
help@apawood.org

EVALUATION SUBJECT:

**GLUED-LAMINATED TIMBER COMBINATIONS AND THE
GAP2006 COMPUTER PROGRAM**

ADDITIONAL LISTEES:

CALVERT COMPANY, INC.
218 V STREET
VANCOUVER, WASHINGTON 98661

CASCADE STRUCTURAL LAMINATORS, LLC, INC.
195 RIBELIN ROAD
CHEHALIS, WASHINGTON 98532

ROSBORO
2509 MAIN STREET
SPRINGFIELD, OREGON 97477

STANDARD STRUCTURES INC.
5900 PRUITT AVENUE
WINDSOR, CALIFORNIA 95492

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

Property evaluated:

Structural

2.0 USES

The GAP2006 computer program is utilized to determine design stresses for the specific layouts of glued-laminated timbers listed in Tables 1 and 2 of this report.

Glued-laminated timbers manufactured to the glued-laminated timber combinations or single grade layouts that have been developed using the GAP2006 program, and that are produced at the facilities listed in Table 3, are recognized

as being in compliance with the design parameters indicated in Section 3.0 of this report.

3.0 DESCRIPTION

The GAP2006 computer program is based on the principles of ASTM D 3737. It is an alternative method for determining associated allowable design stresses for a given layout combination of glued-laminated timber. The GAP2006 computer program complies with the IBC, IRC and UBC for allowable stress design. The design assumptions discussed in Sections 3.1 through 3.4 of this report are basic parameters utilized with the development of the allowable design stresses for the combinations listed in Table 1 or single grade layouts listed in Table 2. See Section 5.4 for requirements applicable to these parameters.

3.1 Adhesive:

Face and end-joint bonding adhesives comply with ASTM D 2559 for exterior or wet use.

3.2 End Joints:

End joints comply with ANSI A190.1 and ASTM D 3737.

3.3 Lumber:

Lumber having a nominal thickness of 2 inches or less is glued-laminated into rectangular cross sections complying with industry standards for depth, width, and appearance. Lumber that is E-rated or visually graded complies with rules of applicable approved lumber grading agencies and the procedures set forth in the manufacturer's quality control documentation. Quality control for E-rating and beam fabrication is conducted under the supervision of an approved third-party inspection agency. Grade specifications are included in rules of the applicable approved lumber grading agencies and follow industry classifications and nomenclature as provided in the applicable code.

3.4 Layout:

Beams are fabricated in accordance with ANSI A190.1 using the grade combinations noted in Table 1 or single grade layouts noted in Table 2 of this report. Combinations are in accordance with ASTM D 3737 requirements. Resawn purlin beams, manufactured by ripping nominally 6-inch beams vertically through their depth into two members of equal width, are permitted to be produced from Canadian spruce-pine (CSP) and spruce-pine-fir (SPF) combinations in this width without any variation in basic grade description or layout procedures.

4.0 DESIGN

The design requirements of structural glued-laminated timber must comply with Section 2306 or 2307 of the IBC; Sections R502.2 and R802.2 of the IRC; or Section 2316.1 of the UBC, as applicable. Modifications of values for duration of load must comply with the IBC, IRC or UBC, as applicable.

5.0 CONDITIONS OF USE

The specific layups for the glued-laminated timbers described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The application of the GAP2006 computer program is limited to the layup combinations shown in Tables 1 or 2. Design stresses for normal conditions of loading must not exceed those set forth in Tables 1 or 2.
- 5.2 Design stresses for combinations, as noted in Tables 1 or 2, are for members with four or more laminations stressed primarily in bending due to loads applied perpendicular to the wide faces of the laminations.
- 5.3 The effects of checking of the members are outside the scope of this report.
- 5.4 Glued-laminated timber manufactured to the glued-laminated timber combinations or single grade layups that have been developed using the GAP2006 program, listed in Tables 1 and 2, and that are produced at the facilities listed in Table 3, are recognized as being in compliance with the design parameters indicated in Section 3.0 of this report.

Evaluation of glue-laminated timber manufactured in accordance with this report but produced by manufacturers not listed in Table 3 must be recognized in a current ICC-ES report as being in compliance with the design parameters indicated in Section 3.0 of this report.

- 5.5 The quality program for monitoring the use of the GAP2006 computer program must be in accordance with "Quality Control Requirements for the GAP Computer Program," dated July 26, 2006.

6.0 EVIDENCE SUBMITTED

- 6.1 Program Guide for the GAP2006 Computer Program.
- 6.2 Data in accordance with ASTM D 3737.
- 6.3 Quality system documentation.

7.0 IDENTIFICATION

Each glued-laminated beam manufactured using layup combinations determined in accordance with this report and produced at the facilities listed in Table 3 must be identified with the ICC-ES evaluation report number (ESR-1940).

TABLE 2—DESIGN VALUES FOR STRUCTURAL GLUED-LAMINATED SINGLE GRADE LAYUPS FOR NORMAL DURATION OF LOAD AND DRY CONDITIONS OF USE^{1,2,3}

Comb Symbol	Species	Grade	Modulus of Elasticity E 10 ⁶ psi	Compression Perpendicular to Grain F _c ^a psi	Axially Loaded			Bending about Y-Y Axis						Bending about X-X Axis			Fasteners
					Tension Parallel to Grain F _t psi	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 SG			
						4 or More Lams F _c psi	2 or 3 Lams F _c psi	Bending		Shear Parallel to Grain		Bending			See Note 7 F _{vx} psi		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Western Species																	
EWS 1	DF	L3	1.5	560	900	1,550	1,200	1,450	1,250	1,000	230	1,250	265	0.50			
EWS 2	DF	L2	1.6	560	1,250	1,950	1,600	1,800	1,600	1,300	230	1,700	265	0.50			
EWS 3	DF	L2D	1.9	650	1,450	2,300	1,850	2,100	1,850	1,550	230	2,000	265	0.50			
EWS 5	DF	L1	2.0	650	1,600	2,400	2,100	2,400	2,100	1,800	230	2,200	265	0.50			
EWS 22 ⁽⁶⁾	SW	L3	1.0	315	525	850	675	800	700	550	170	725	195	0.35			
EWS 70	AC	L2	1.3	470	975	1,450	1,450	1,400	1,250	1,000	230	1,350	265	0.47			
Southern Pine																	
EWS 47	SP	N2M14	1.4	650	1,200	1,900	1,150	1,750	1,550	1,300	260	1,400	300	0.55			
EWS 48	SP	N2D14	1.7	740	1,400	2,200	1,350	2,000	1,800	1,500	260	1,600	300	0.55			
EWS 49	SP	N1M16	1.7	650	1,350	2,100	1,450	1,950	1,750	1,500	260	1,800	300	0.55			
EWS 50	SP	N1D14	1.9	740	1,550	2,300	1,700	2,300	2,100	1,750	260	2,100	300	0.55			
Wet-use factors																	
			0.833	0.53	0.8	0.73			0.8		0.875	0.8	0.875	0.875	see NDS		

For S1: 1 psi = 6,895 Pa.

- 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 end of the table.
- The tabulated design values are for normal duration of loading. For other durations of loading, see applicable building code.
- The symbols used for species are AC = Alaska cedar, DF = Douglas fir-larch, SP = Southern pine, and SW = Softwood species.
- The tabulated F_{vy} values are for members of 4 or more lams. The tabulated F_{vy} values must 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 must 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 must be multiplied by a factor of 0.5. This adjustment must be cumulative with the adjustment given in Footnote No. 4.
- 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.
- 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} values must be multiplied by 0.72.
- When Western Cedars, Western Cedars (North), Western Woods, and Redwood (open grain) are used in combinations for Softwood Species (SW), the design values for modulus of elasticity (E_x and E_y) must 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), design values for shear parallel to grain (F_{vx} and F_{vy}) must be reduced by 10 psi before applying any adjustments.

TABLE 3—MANUFACTURING LOCATION USING THE GAP2006 PROGRAM

MANUFACTURER	LOCATION
Calvert Company, Inc.	218 V Street, Vancouver, Washington 98661
Calvert Company, Inc.	3559 Truman Road, Washougal, Washington 98671
Cascade Structural Laminators, LLC, Inc.	195 Ribelin Road, Chehalis, Washington 98532
Rosboro	2509 Main Street, Springfield, Oregon 97477
Rosboro	22833 Vaughn Road, Veneta, Oregon 97487
Standard Structures Inc.	5900 Pruitt Avenue, Windsor, California 95492