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CCMC 12698-R

CCMC

*EVALUATION
REPORT*

DIVISION	06173
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Re-Evaluation
in process

G-P Lam® LVL

Georgia-Pacific Corporation
1000 North Park Drive
Roxboro, North Carolina
U.S.A. 27573

Tel.: (336) 599-1000
Fax: (336) 597-8680

Plant: Roxboro, North Carolina
U.S.A.

1. Purpose of Evaluation

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that “G-P Lam® LVL” can serve as lumber, with respect to structural capacity, in compliance with the intent of the National Building Code of Canada (NBC) 1995.

2. Opinion

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that “G-P Lam® LVL” complies with CCMC’s Technical Guide for Structural Composite Lumber, Masterformat number 06173, dated 02-04-03, and with respect to structural capacity, provides a level of performance equivalent to that required in:

- NBC 1995, Section 9.23., when designed in accordance with:
CSA O86-01, “Engineering Design in Wood”

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Adhesives comply, as per ASTM D5456, with the appropriate requirements in:

- CSA O112.6-M1977, “Phenol and Phenol-Resorcinol, Resin Adhesives for Wood (High-Temperature Curing).”

Canada Mortgage and Housing Corporation permits the use of this product in construction financed or insured under the National Housing Act.

3. Description

“G-P Lam® LVL” laminated veneer lumber (see Figure 1) is manufactured by laminating veneers of Southern Yellow Pine, Yellow Poplar or a combination of the two (referred to as “Eastern Species”) with the grain of the veneer oriented parallel to the length of the member. The veneers are bonded with an exterior-type phenolic resin (phenol formaldehyde). The veneer joints are staggered with those in the adjacent layer.

“G-P Lam® LVL” is available in thicknesses ranging from 19 to 133 mm, in depths from 89 to 1220 mm, and in lengths of up to 24.4 m. “G-P Lam® LVL” is available in two grades of Southern Pine, two grades of Yellow Poplar and one grade of Eastern Species.

Third-party product certification is provided by APA-EWS, accredited by Standards Council of Canada through monthly and yearly audits of the quality assurance program.

The permitted design values are outlined in Table 1.

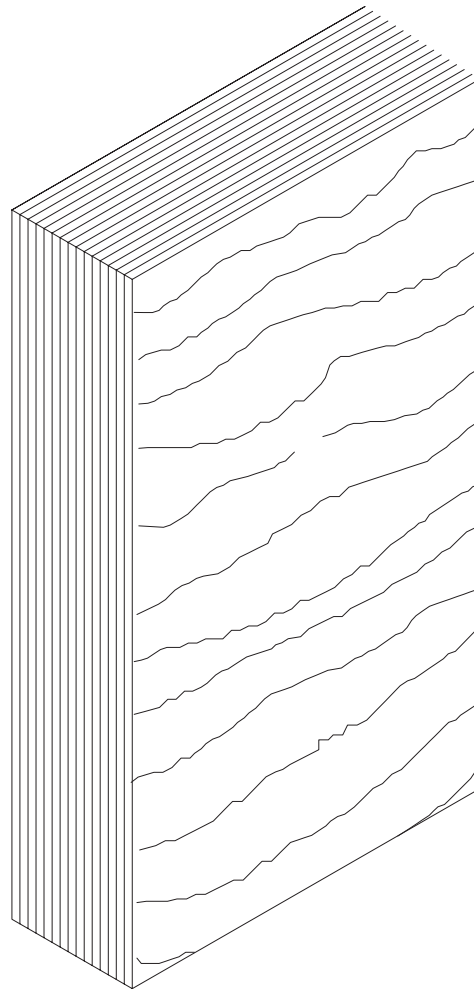


Figure 1. A Block of “G-P Lam® LVL”

Table 1. Specified Strengths (Limit States Design) for “G-P Lam® LVL” for Dry Conditions of Use (MPa)

Mechanical Properties	Stress Grade ^{1,2} (MPa)				
	1.8-YP	2.0-YP	2.0-SP	2.2-SP	2.0-ES
Flexural stress, $f_b^{3,6}$ (joist)	37.59	40.14	40.14	41.41	40.14
Tension parallel to grain ⁴ , f_t	24.21	27.08	23.25	26.12	23.25
Compression parallel to grain, f_c par.	25.58	30.26	30.26	36.42	30.26
Compression perp. to grain ⁵ , f_c perp. • Parallel to the glue line (joist)	9.41	9.41	9.41	9.41	9.41
Horizontal Shear, f_v • Perp. to the glue line (joist)	3.65	3.65	3.65	3.65	3.65
Modulus of Elasticity (E) ⁵	12 411	13 790	13 790	15 168	13 790

Table 1 Notes:

1. Yellow Poplar - YP, Southern Pine - SP, Eastern Species - ES.
2. Specified Strengths and modulus of elasticity are based on covered, dry service conditions of use in which the moisture content does not exceed 19%.
3. f_b specified strengths are for a 305 mm depth. For other depths, multiply by the factor in the table below or $(305/d)^{1/9}$. For depths less than 89 mm, use factor for 89-mm depth.

Depth (mm):	89	140	184	235	286	305	406	457	508	610
Multiplier = $(305/d)^{1/9}$ where d = depth (mm)	1.15	1.09	1.06	1.03	1.01	1.00	0.97	0.96	0.94	0.93

4. Tension values are adjusted to a specified length of 6 096 mm (20'). For other lengths, multiply by $(6096/L)^{1/18}$.
5. Duration of load adjustments to E and f_c perp. are not permitted.
6. “G-P Lam® LVL” used as a repetitive member, in accordance with CSA O86-01, may have f_b increased 4%, in addition to the depth factor multiplier in Note 3 above.

Table 2. Fastener Capacities for “G-P Lam® LVL”

Nail Withdrawal	Nail Orientation	Load Direction	Specific Gravity of Equivalent Species for Design Purposes ⁽¹⁾
2.0E LVL, SYP 2.2E LVL, SYP 1.8E LVL, YP 2.0E LVL, YP 2.0E LVL, ES	Face	Withdrawal	DF-L, SG=0.50
	Edge	Withdrawal	
Lateral Nail Capacity	Nail Orientation	Load Direction	Specific Gravity of Equivalent Species for Design Purposes ⁽¹⁾
2.0E LVL, SYP 2.2E LVL, SYP 1.8E LVL, YP 2.0E LVL, YP 2.0E LVL, ES	Edge	Parallel to grain	DF-L, SG=0.50
	Face	Parallel and perpendicular to grain	
Bolt Bearing Capacity	Bolt Size	Load Direction	Specific Gravity of Equivalent Species for Design Purposes ⁽¹⁾
2.0E LVL, SYP 2.2E LVL, SYP 1.8E LVL, YP 2.0E LVL, YP 2.0E LVL, ES	12.5 mm	Parallel to grain	DF-L, SG=0.50
	19.0 mm	Parallel to grain	
	12.5 mm	Perpendicular to grain	
	19.0 mm	Perpendicular to grain	

1. The ‘equivalent species’ specific gravity/mean relative density is provided for fastener design for bearing-type failures in accordance with CSA O86-01.

Table 3. Nail Spacing Limitations-Parallel to Glueline

LVL Species	LVL Size	Nail Spacing (in-edge)	Size of Nails (Penny and metric length designation)
YP, SYP, ES	≥ 19 mm wide, ≥ 89 mm deep	≥ 152 mm o.c.	10d or 12d nails and 14 gauge staples (i.e. 76 mm or 82 mm nails and 1.6 mm dia. staples)
YP, ES	≥ 44 mm wide, ≥ 89 mm deep	≥ 102 mm o.c.	
SYP	≥ 44 mm wide, ≥ 89 mm deep	≥ 152 mm o.c.	
SYP	≥ 44 mm wide, ≥ 140 mm deep	≥ 102 mm o.c.	16d nails (i.e. 89 mm nails)
YP, SYP, ES	≥ 44 mm wide, ≥ 140 mm deep	≥ 203 mm o.c.	

4. Usage and Limitations

“G-P Lam® LVL” is permitted for use in construction as an alternative material for lumber, including lumber used as studs, floor joists, ceiling joists, roof joists, rafters, beams, lintels, sills, plates, and stair stringers. The use of “G-P Lam® LVL” is subject to the following conditions:

- “G-P Lam® LVL” shall be designed in accordance with the requirements of the NBC 1995, Part 4, and CSA O86-01, Engineering Design in Wood.
- Except as noted below, the drawings and related documents shall bear the authorized seal and signature of a professional engineer skilled in wood design and licensed to practice under the appropriate provincial or territorial legislation. The drawings shall bear a statement to the effect that the design is in accordance with the requirements of NBC 1995, Section 4.3., and show the governing design loads and deflections.
- The specified strengths for “G-P Lam® LVL” shall not exceed the design values set forth in Table 1 and 2.

When used as a floor joist, “G-P Lam® LVL”, must be designed to meet the serviceability vibration requirement specified in NBC 1995, Sentence 9.23.4.1.(2)

- An engineer’s seal is not required when “G-P Lam® LVL” is used in buildings which fall within the scope of Part 9 of the NBC, and when used as floor beams and headers supporting uniform loads “only” installed in accordance with Georgia-Pacific Corporation’s Technical Literature for typical installation details and spans in “Factored Resistance Table, Floor or Roof-Standard Term” sealed and dated January 2003.
- The compression edges of all “G-P Lam® LVL” joists, rafters, and beams shall be laterally supported at least every 610 mm. The ends of all “G-P Lam® LVL” joists, rafters, and beams must be restrained to prevent rollover. This is normally provided by diaphragm sheathing attached to the top or compression

edge, and an end wall or shear transfer panel capable of transferring a minimum of 730 N/m or the required shear forces due to wind or seismic conditions. Blocking or cross-bracing with equivalent strength may be used.

- Nailing of “G-P Lam® LVL” shall conform to NBC 1995, Table 9.23.3.4. or as specific design requires (see Table 3).
- The manufacturer’s current installation instructions must be followed for notching, drilling and taper cuts in G-P Lam® LVL as well as nailed and bolted multiple ply beams.
- Moisture content of the “G-P Lam® LVL” shall not exceed 19 % at the time of installation, and the product shall not be used in applications where moisture content can exceed 19 % or be exposed directly to weather and high humidity.
- This product must be identified with the phrase “CCMC # 12698-R” along the side of the beam or header member. This CCMC number is only valid when it appears in conjunction with the certification mark of APA-EWS.

Installation must follow the manufacturer’s current instructions. Detailed instructions for the installation of “G-P Lam® LVL” are available from the manufacturer.

5. Performance

Testing of “G-P Lam® LVL” was conducted by a testing agency recognized by CCMC.

The manufacturer warrants “G-P Lam® LVL” to be free from manufacturing defects in workmanship and material, if it is used in strict accordance with the manufacturer’s published instructions. The designer shall use the properties specified in Table 1, 2 and 3.

Summary of Tests

Structural testing of “G-P Lam® LVL” was witnessed by an independent testing agency recognized by CCMC. The tests were made in accordance with CCMC Technical Guide “Structural Composite Lumber,” Masterformat number 06173, dated 02-04-03. The results of the test program are summarized below.

Bending Strength and Stiffness

A total of 290 specimens were tested in edgewise and flatwise bending. A parametric approach was chosen to determine the characteristic value. Qualification test data have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from CSA O86-01 was used to determine the specified strength.

Tension Parallel to Grain

A total of 296 specimens were tested in tension. A parametric approach was chosen to determine the characteristic value. Qualification test data have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from CSA O86-01 was used to determine the specified strength.

Compression Parallel to Grain

A total of 212 specimens were tested and a parametric approach was chosen to determine the characteristic value. Qualification test data have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from CSA O86-01 was used to determine the specified strength.

Shear

A total of 212 specimens were tested parallel and perpendicular to grain. A parametric approach was chosen to determine the characteristic value. Qualification test data have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from CSA O86-01 was used to determine the specified strength.

Creep and Recovery

Twelve (12) joist specimens of “G-P Lam® LVL” were tested in accordance with the CCMC Creep and Recovery Test (short-term), resulting in acceptable performance.

Sixty (60) “G-P Lam® LVL” specimens were tested in accordance with a 90-day Creep and Recovery Test, resulting in acceptable performance.

Compression Perpendicular to Grain

Specimens were tested and the average stress for a 1 mm deformation was determined. The characteristic value was multiplied by 1.09 to establish the specified strength in accordance with CSA O86-01.

Fasteners

Nail withdrawal values were established following ASTM D 1761 for an 8d common nail having a 31.75 mm penetration. Twenty specimens were tested and equivalent species capacity was determined in accordance with ASTM D 5456 A2.5.

Dowel bearing strength was determined as per ASTM D 5764-95 with 10d common nails with a nominal diameter of 3.76 mm and a lead hole diameter of 2.77 mm. Thirty-five (35) Southern Yellow Pine and 33 Yellow Poplar specimens were tested and the mean bearing capacity was used to establish the equivalent species capacity as per ASTM D 5456 A2.5.

Bolt bearing capacity was determined as per ASTM D 5764-95 with 12.5 and 19.0 mm. Ninety-six (96) specimens were tested of each species (24 specimens for each bolt and LVL face combination) and the mean bolt bearing capacity was used to establish the equivalent species capacity as per ASTM D 5456 A2.5.

Manufacturing Quality Assurance

The manufacturing quality assurance program and records are verified by APA-EWS as part of the product certification.

For additional information contact:

Bruno Di Lenardo, P.Eng.
(613) 993-7769

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John Flack, Ph.D.
Acting Manager, CCMC

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