GP LAM® Laminated Veneer Lumber
Georgia-Pacific Wood Products South LLC

PR-L266C
Revised March 20, 2015

Product: GP Lam® 1.5E, 1.9E, 2.0E-ES, and 2.0E-3100F_b LVL
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1. Basis of the product report:
   - 2010 National Building Code of Canada: Clause 1.2.1.1 of Division A and Clauses 4.1, 4.3.1.1, and 9.23 of Division B
   - CSA O86-14 Engineering Design in Wood
   - ASTM D5456-13a recognized by CAN/CSA O86-14
   - APA Reports T97P-26, T98P-10, T2000P-24, T2002P-12, T2002P-15, T2003P-46, T2003P-81A, T2004P-09, T2004P-25, T2004P-26, T2004M-41, T2004P-48, T2004M-56, T2004M-80, T2005M-23, T2005P-25, T2005M-97, T2007P-08, T2007P-09, T2007P-10, T2007P-59, and T2007P-98, and other qualification data

2. Product description:
   GP Lam LVL is made with veneer sheets of various species and grades in accordance with the in-plant manufacturing standards approved by APA. GP Lam LVL is available in thicknesses from 19 mm (3/4 inch) to 89 mm (3-1/2 inches), widths of 89 mm (3-1/2 inches) to 1,219 mm (48 inches) and lengths up to 24 m (80 feet).

3. Design properties:
   Table 1 lists the Limit States Design properties; Table 2 lists the equivalent relative densities for connection design; and Table 3 lists the minimum fastener spacing for GP Lam LVL. The factored resistances for GP Lam LVL shall be in accordance with the recommendations provided by the manufacturer (www.buildgp.com/gp-lam-lvl).

4. Product installation:
   GP Lam LVL shall be installed in accordance with the recommendations provided by the manufacturer. Permissible details and maximum hole sizes shall be in accordance with the recommendations provided by the manufacturer.

5. Fire-rated assemblies:
   Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer and approved by the authority having jurisdiction (AHJ).

6. Limitations:
   a) GP Lam LVL shall be designed in accordance with the code using the design properties specified in this report.
   b) GP Lam LVL is limited to dry service conditions, as defined in CSA O86, at which the average equilibrium moisture content of solid-sawn lumber over a year is 15 percent or less and does not exceed 19 percent.
   c) The 1.9E, 2.0E-ES, and 2.0E-3100F_b GP Lam LVL grades are produced at the Georgia-Pacific Wood Products LLC facility in Roxboro, North Carolina or Georgia-Pacific Wood Products South LLC facility in Thorsby, Alabama under a quality assurance program audited by APA.
   d) The 1.5E GP Lam LVL grade is produced at the Georgia-Pacific Wood Products South LLC facility in Thorsby, Alabama under a quality assurance program audited by APA.
   e) This report is subject to re-examination in one year.

7.   Identification:
      GP Lam LVL described in this report is identified by a label bearing the manufacturer's name
      and/or trademark, the APA assigned plant number (1027 for the Roxboro plant or 1086 for
      the Thorsby plant), the LVL grade, the APA logo, the report number PR-L266 (or PR-
      L266C), and a means of identifying the date of manufacture.

      Identification may include one or more of the following:

GP Lam LVL, Georgia-Pacific, Georgia-Pacific Wood Products LLC, or Georgia-Pacific Wood Products South LLC
International Beams LVL (for International Beams Inc.)

Table 1. Specified Strengths and MOE (Limit States Design for Use in Canada) for GP Lam
LVL[(a,b)]

Property		Specified Strengths and MOE for Limit States Design, MPa (psi)			
		1.5E or 1.5E-2250F_b	1.9E or 1.9E-2750F_b	2.0E-ES or 2.0E-2900F_b	2.0E-3100F_b
Bending (f_b)[(c)]	Joist	28.67 (4,155)	35.04 (5,080)	36.95 (5,360)	39.50 (5,730)
Tension parallel to grain (f_t)[(d)]		15.19 (2,200)	18.44 (2,675)	19.80 (2,870)	20.61 (2,990)
Longitudinal shear (f_v)	Joist	3.63 (525)	3.76 (545)	3.76 (545)	3.76 (545)
Compression parallel (f_c)		24.21 (3,510)	27.51 (3,990)	28.61 (4,150)	33.01 (4,785)
Compression perpendicular (f_{cp})	Joist	9.41 (1,365)	10.61 (1,535)	10.61 (1,535)	10.61 (1,535)
Modulus of Elasticity (E)		10,342[(f)] (1.5x10^6)[(f)]	13,100[(e)] (1.9x10^6)[(e)]	13,790[(f)] (2.0x10^6)[(f)]	13,790[(e)] (2.0x10^6)[(e)]

[(a)] The tabulated values are specified strengths and modulus of elasticity for standard-term load duration.
All values, except for E, are permitted to be adjusted for other load durations as permitted by the code.
The tabulated values are limited to dry service conditions.

[(b)] Joist = load parallel to glueline.

[(c)] The tabulated values are based on a reference depth of 305 mm (12 inches). For other depths, when
loaded edgewise, the specified bending strength (f_b) shall be modified by $(305/d)^{1/9}$ for 2.0E-ES LVL,
where d = depth in mm; and $(305/d)^{1/6.5}$ for 1.5E, 1.9E, and 2.0E-3100F_b LVL, where d = depth in mm.
For depths less than 89 mm (3-1/2 inches), the factor for the 89 mm (3-1/2 inches) depth shall be used.

GP Lam® LVL	Depth mm (in.)	89 (3-1/2)	140 (5-1/2)	184 (7-1/4)	235 (9-1/4)	286 (11-1/4)	305 (12)	406 (16)	457 (180)	508 (20)	610 (24)
2.0E-ES	Multiply by	1.15	1.09	1.06	1.03	1.01	1.0	0.97	0.96	0.94	0.93
1.5E, 1.9E, 2.0E-3100Fb		1.21	1.13	1.08	1.04	1.01	1.0	0.96	0.94	0.92	0.90

[(d)] The tabulated values are based on a reference length of 6,096 mm (20 feet). For other lengths, the
specified tensile strength shall be modified by $(6,096/\ell)^{1/10}$, where ℓ = length in mm. For lengths less
than 1,219 mm (4 feet), the factor for the length of 1,219 mm (4 feet) shall be used.

[(e)] The MOE values given are the apparent modulus of elasticity and include the effects of shear
deformations. When calculating deflection, only the bending deformations need be included and the
second term of the equation in footnote (f) may be ignored.

[(f)] The MOE values given are the shear-free modulus of elasticity. When calculating deflection, both
bending and shear deformations must be included. The deflection equation for a simply-supported beam
under uniform load is:

$$\delta = \frac{156.3\,w\,L^4}{E\,b\,d^3} \times 10^6 + \frac{2400\,w\,L^2}{E\,b\,d}$$

Where: δ = estimated deflection, mm   w = uniform load, N/m
        L = span, m   E = modulus of elasticity, MPa
        b = beam width, mm   d = beam depth, mm

or

$$\delta = \frac{270\,w\,L^4}{E\,b\,d^3} + \frac{28.8\,w\,L^2}{E\,b\,d}$$

Where: δ = Estimated deflection, inches   w = uniform load, plf
           L = span, feet   E = tabulated modulus of elasticity, psi
           b = beam width, inches   d = beam depth, inches

Table 2. Fastener Details for GP Lam LVL[a]

LVL Grade	Equivalent Relative Density (G)					
	Nails				Bolts	
	Withdrawal Load		Lateral Load		Lateral Load	
					Installed in Face	
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Parallel to Grain	Perpendicular to Grain
1.5E	Hemlock/ fir (0.43)	Hemlock/ fir (0.43)	Hemlock/ fir (0.43)	Western hemlock (0.47)	Hemlock/ fir (0.43)	Hemlock/ fir (0.43)
1.9E, 2.0E-ES, 2.0E-3100F$_b$	Hemlock/ fir (0.43)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)	Douglas-fir/ larch (0.50)

[a] Fastener values determined using the equivalent relative densities in this table are for standard-term load duration and are permitted to be adjusted for other load durations as permitted by the code.

Table 3. Minimum Fastener Spacing for Installation Parallel to the Glue Line in GP Lam LVL[a,b,c]

Minimum Member Size, mm (in.)	Connector: Length, mm (in.)	Nails Installed in the Narrow Face
		Minimum On-Center Spacing, mm (in.)
19 x 89 (3/4 x 3-1/2)	10d box or common, 12d common, 16d sinker: 82 (3-1/4) and smaller	152 (6)
	14 gage staples: 1.6 (1/16))	152 (6)
44 x 140 (1-3/4 x 5-1/2)	10d box or common, 12d common, 16d sinker: 82 (3-1/4) and smaller	102 (4)
	14 gage staples: 1.6 (1/16)	102 (4)
	16d common: 89 (3-1/2)	203 (8)

[a] The minimum on-center spacing permitted for nails installed in the wide face of GP Lam LVL, i.e., perpendicular to the glue line, is the same as that permitted by the applicable code for solid-sawn lumber.
[b] Edge distance shall be sufficient to prevent splitting.
[c] Fastener sizes and minimum on-center spacing not specifically described above are beyond the scope of this report.

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