

GPI Series I-Joists
Boise Cascade Company

PR-L255
Revised August 21, 2017

Products: GPI 20, 40, 65, and 90 Series I-Joists
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BC.Com/manufacturing/GP-EWP

1. Basis of the product report:
 - 2015, 2012 and 2009 International Building Code (IBC): Sections 104.11 Alternative materials and 2303.1.2 Prefabricated wood I-joists
 - 2015 International Residential Code (IRC): Sections R104.11 Alternative materials and R502.1.2 Prefabricated wood I-joists
 - 2012 and 2009 IRC: Sections R104.11 Alternative materials and R502.1.4 Prefabricated wood I-joists
 - ASTM D5055-13, D5055-09, and D5055-05 recognized by the 2015 IBC and IRC, 2012 IBC and IRC, and 2009 IBC and IRC, respectively
 - Performance Standard for APA EWS I-Joists, PRI-400
 - APA Reports T1999P-07, T1999P-24, T2001M-1, T2001P-21, T2001P-84, T2001M-89, T2002M-60A, T2003M-43, T2003M-44A, T2003M-55, T2003P-62, T2003P-70, T2003M-78, T2004M-44, T2005M-10, T2005M-53, T2006M-71, T2007M-29, T2007P-54, T2007M-65, T2007P-83, T2007M-108, T2008P-48, T2010P-12, T2010P-34, T2010M-45, T2011M-20, and T2011P-64, and other qualification data
2. Product description:

GPI 20, 40, 65, and 90 Series I-joists, as described in Table 1, are made with laminated veneer lumber (LVL) flanges and an OSB web in accordance with the in-plant manufacturing standard approved by APA.
3. Design properties:

Table 2 lists the design properties for GPI 20, 40, 65, and 90 Series I-joists. The allowable spans for GPI Series I-joists covered by this report shall be in accordance with the recommendations provided by the manufacturer (BC.Com/manufacturing/GP-EWP/wood-i-beam-joists) and APA *Performance Rated I-Joists*, Form Z725 (www.apawood.org/resource-library) for products qualified for PRI Series.
4. Product installation:

GPI 20, 40, 65, and 90 Series I-joists shall be installed in accordance with the recommendations provided by the manufacturer (see link above) and APA *I-Joist Construction Details*, Form D710 (see link above). Permissible web holes and cantilever reinforcements shall be in accordance with the recommendations provided by the manufacturer and with APA D710 for products qualified for PRI Series.
5. Fire-rated assemblies:

Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer (see link above), APA Product Report PR-S255, or APA *Fire-Rated Systems*, Form W305 (see link above).

6. Limitations:
- a) GPI 20, 40, 65, and 90 Series I-joists shall be designed in accordance with the code using the design properties specified in this report.
 - b) GPI 20, 40, 65, and 90 Series I-joists are limited to dry service conditions where the average equilibrium moisture content of sawn lumber is less than 16 percent.
 - c) GPI 40, 65, and 90 Series I-joists are produced at Boise Cascade's facilities in Roxboro, North Carolina or Thorsby, Alabama under a quality assurance program audited by APA.
 - d) GPI 20 Series I-joists are produced at Boise Cascade's facility in Roxboro, North Carolina under a quality assurance program audited by APA.
 - e) This report is subject to re-examination in one year.

7. Identification:
 The GPI Series prefabricated wood I-joists described in this report are identified by a label bearing the manufacturer's name (Boise Cascade Company) and/or trademark, the APA assigned plant number (1027 for the Roxboro plant and 1085 for the Thorsby plant), the I-joist depth and series, the APA logo, the report number PR-L255, and a means of identifying the date of manufacture.

Table 1. Description of GPI 20, 40, 65, and 90 Series I-joists^(a)

Joist Series	Joist Depths (in.)	Flanges			Web	
		Material	Dimension		Material	Thickness (in.)
			Depth (in.)	Width (in.)		
GPI 20	9-1/2 - 14	LVL	1-3/8	1-3/4	OSB	13/32
GPI 40	9-1/2 - 16	LVL	1-3/8	2-5/16	OSB	13/32, 7/16 ^(b)
GPI 65	9-1/2 - 16	LVL	1-3/8	2-7/16	OSB	13/32, 7/16 ^(b)
GPI 90	11-7/8 - 16	LVL	1-1/2	3-1/2	OSB	13/32, 7/16 ^(c)

^(a) Referenced dimensions are nominal. Tolerances are as specified in the plant quality manual.

^(b) When manufactured at the Thorsby facility (plant number 1085), the web thickness is 7/16 inch for 16-inch deep I-joists.

^(c) The web thickness is 7/16 inch for 16-inch deep I-joists.

Table 2. Design Properties (Allowable Stress Design) for GPI Series I-Joists ^(a,b)

Joist Depth (in.)	Joist Series	Also Qualified for	EI ^(c) (x10 ⁶ lbf-in. ²)	M ^(d) (lbf-ft)	V ^(e) (lbf)	End Reaction ^(f) (lbf)				Intermediate Reaction ^(g) (lbf)				C ^(h) (x10 ⁶ ft-lbf/in.)
						1-3/4 in. Brg. Length		4 in. Brg. Length		3-1/2 in. Brg. Length		5-1/4 in. Brg. Length		
						w/o Brg. Stiff	w/Brg. Stiff	w/o Brg. Stiff	w/Brg. Stiff	w/o Brg. Stiff	w/Brg. Stiff	w/o Brg. Stiff	w/Brg. Stiff	
9-1/2	GPI 20	PRI-20	159	3,000	1,135	1,050	---	1,135	---	2,340	2,495	3,000	3,145	0.412
	GPI 40	PRI-40	193	3,090	1,200	1,120	---	1,200	---	2,600	2,650	3,025	3,150	0.412
	GPI 65	---	254	4,900	1,210	1,120	---	1,210	---	2,610	2,700	3,070	3,175	0.412
11-7/8	GPI 20	PRI-20	274	3,870	1,435	1,100	---	1,435	---	2,340	2,640	3,000	3,170	0.515
	GPI 40	PRI-40	330	3,990	1,460	1,225	---	1,460	---	2,600	2,750	3,025	3,175	0.515
	GPI 65	---	434	6,325	1,495	1,230	---	1,495	---	2,610	2,800	3,070	3,200	0.515
	GPI 90	PRI-90	661	10,255	1,925	1,400	1,900	1,900	1,925	3,355	3,850	3,850	---	0.515
14	GPI 20	---	409	4,640	1,710	1,150	1,225	1,690	1,710	2,340	2,800	3,000	3,195	0.607
	GPI 40	PRI-40	482	4,790	1,715	1,250	---	1,715	---	2,600	2,850	3,025	3,200	0.607
	GPI 65	---	640	7,605	1,740	1,335	---	1,740	---	2,610	2,900	3,070	3,225	0.607
	GPI 90	PRI-90	965	12,235	2,125	1,400	1,900	1,900	2,125	3,355	3,855	3,970	4,250	0.607
16	GPI 40	PRI-40	657	5,550	1,990	1,235	1,350	1,550	1,990	2,600	2,950	3,025	3,225	0.693
	GPI 65	---	877	8,755	2,000	1,345	1,575	1,650	2,000	2,610	3,000	3,070	3,250	0.693
	GPI 90	PRI-90	1,306	14,020	2,330	1,400	1,900	1,900	2,330	3,355	3,855	3,970	4,470	0.693

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 lbf = 4.448 N.

- (a) The tabulated values are design values for normal duration of load. All values, except for EI, C, and vertical load transfer (see footnote b) shall be permitted to be adjusted for other load durations as permitted by the code.
- (b) The maximum vertical load transfer of GPI Series I-Joists is 2,000 plf.
- (c) Bending stiffness (EI) of the I-joist.
- (d) Moment capacity (M) of the I-joist, which shall not be increased by any repetitive member use factor.
- (e) Shear capacity (V) of the I-joist.
- (f) Interpolation of the end reaction between 1-3/4- and 4-inch bearing, with or without bearing stiffeners, respectively, is permitted.
- (g) Interpolation of the intermediate reaction between 3-1/2- and 5-1/4-inch bearing, with or without bearing stiffeners, respectively, is permitted.
- (h) Coefficient of shear deflection (C). For calculating uniform load and center-point load deflections of the I-joist in a simple-span application, use Eqs. 1 and 2.

$$\text{Uniform Load: } \delta = \frac{22.5\omega\ell^4}{EI} + \frac{\omega\ell^2}{C} \quad [1]$$

$$\text{Center-Point Load: } \delta = \frac{36P\ell^3}{EI} + \frac{2P\ell}{C} \quad [2]$$

Where:

- δ = calculated deflection (in.),
- ω = uniform load (lbf/ft),
- ℓ = design span (ft),
- P = concentrated load (lbf),
- EI = bending stiffness of the I-joist (lbf-in.²), and
- C = coefficient of shear deflection (lbf-ft/in.).

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