

Wood I Beam[™]: WI Series I-Joists
Boise Cascade Company

PR-L256
Revised August 21, 2017

Products: WI 40, WI 60, and WI 80 Series I-Joists
Boise Cascade Company, 1000 North Park Drive, Roxboro, North Carolina 27573
(336) 599-1000
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 T1998Q-20, T1998P-21, T2000P-12A, T2001M-2, T2001M-20, T2003M-79, T2004M-27, T2004M-29, T2007M-23, T2007M-56, T2008M-104, T2009M-31, T2009M-51, T2009M-52, T2010M-45, and T2011P-65 and other qualification data
2. Product description:

The WI Series I-joists covered by this report, as described in Table 1, are made with lumber flanges and OSB webs in accordance with the in-plant manufacturing standard approved by APA.
3. Design properties:

Table 2 lists the design properties for WI Series I-joists. The allowable spans for WI Series I-joists covered by this report shall be in accordance with the recommendations provided by the manufacturer (BC.Com/manufacturing/GP-EWS/wood-i-beam-joists) and APA *Performance Rated I-Joists*, Form Z725 (www.apawood.org/resource-library) for products qualified for PRI Series. For connection design, the specific gravity of the WI flanges shall be limited to 0.42 for WI 40, and 0.46 for WI 60 and WI 80.
4. Product installation:

WI 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 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) WI Series I-joists shall be designed in accordance with the code using the design properties specified in this report.
 - b) WI Series I-joists are limited to dry service conditions where the average equilibrium moisture content of sawn lumber is less than 16 percent.

- c) WI 40, WI 60, and WI 80 Series I-joists are produced at Boise Cascade’s facility in Roxboro, North Carolina and International Beams’ facility in Pohénégamook, Quebec plant under a quality assurance program audited by APA.
- d) This report is subject to re-examination in one year.

7. Identification:

The WI 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 Boise Cascade’s Roxboro, North Carolina plant or 1033 for International Beams’ Pohénégamook, Quebec plant), the I-joist depth and series, the APA logo, the report number PR-L256, and a means of identifying the date of manufacture.

Table 1. Description of WI Series I-joists^(a)

Joist Series	Joist Depths (in.)	Flanges			Web	
		Material	Dimension		Material	Thickness (in.)
			Depth (in.)	Width (in.)		
WI 40	9-1/4 - 16	Proprietary SPF	1-1/2	2-1/2	OSB	3/8 ^(b) , 13/32
WI 60	9-1/4 - 16	MSR SPF	1-1/2	2-1/2	OSB	3/8 ^(b) , 13/32
WI 80	9-1/4 - 16	MSR SPF	1-1/2	3-1/2	OSB	3/8 ^(b) , 13/32

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

^(b) When manufactured at the Pohénégamook, Quebec facility (plant number 1033), the web thickness is 3/8 inch.

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

Joist Depth (in.)	Joist Series	Also Qualified for	EI ^(b) (x10 ⁶ lbf-in. ²)	M ^(c) (lbf-ft)	V ^(d) (lbf)	End Reaction ^(e) (lbf)	Intermediate Reaction ^(f) (lbf)	C ^(g) (x10 ⁶ ft-lbf/in.)	Uniform Vertical Load (lbf/ft)
9-1/4	WI 40	---	181	2,650	1,080	1,030	2,160	0.401	2,000
	WI 60	---	217	3,665	1,080	1,030	2,160	0.401	2,000
	WI 80	---	301	5,210	1,120	1,080	2,240	0.401	2,000
9-1/2	WI 40	PRI-40	193	2,735	1,120	1,080	2,160	0.412	2,000
	WI 60	PRI-60	231	3,780	1,120	1,080	2,160	0.412	2,000
	WI 80	---	320	5,355	1,120	1,080	2,240	0.412	2,000
11-1/4	WI 40	---	289	3,370	1,345	1,200	2,500	0.488	2,000
	WI 60	---	347	4,630	1,345	1,200	2,500	0.488	2,000
	WI 80	---	480	6,550	1,390	1,215	2,750	0.488	2,000
11-7/8	WI 40	PRI-40	330	3,545	1,420	1,200	2,500	0.515	2,000
	WI 60	PRI-60	396	4,900	1,420	1,200	2,500	0.515	2,000
	WI 80	PRI-80	547	6,940	1,420	1,280	2,760	0.515	2,000
14	WI 40	PRI-40	482	4,270	1,710	1,200	2,500	0.607	2,000
	WI 60	PRI-60	584	5,895	1,710	1,200	2,500	0.607	2,000
	WI 80	PRI-80	802	8,360	1,710	1,280	3,020	0.607	2,000
16	WI 40	PRI-40	657	4,950	1,970	1,200	2,500	0.693	2,000
	WI 60	PRI-60	799	6,835	1,970	1,200	2,500	0.693	2,000
	WI 80	PRI-80	1,092	9,690	1,970	1,280	3,020	0.693	2,000

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 Uniform Vertical Load, shall be permitted to be adjusted for other load durations in accordance with the code.
- (b) Bending stiffness (EI) of the I-joist.
- (c) Moment capacity (M) of the I-joist.
- (d) Shear capacity (V) of the I-joist.
- (e) End reaction of the I-joist with a minimum bearing length of 1-3/4 inches without bearing stiffeners. Higher end reactions are permitted. For a bearing length of 4 inches, the end reaction may be set equal to the tabulated shear value. Interpolation of the end reaction between 1-3/4- and 4-inch bearing is permitted. For end reaction values over 1,550 lbf, bearing stiffeners are required.
- (f) Intermediate reaction of the I-joist with a minimum bearing length of 3-1/2 inches without bearing stiffeners.
- (g) 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.

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

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

Where:

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

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