

Wood I Beam[™]: WI Series I-Joists
Georgia-Pacific Wood Products LLC

PR-L256
Revised August 20, 2010

Products: WI 40, WI 60, WI 80, WI 80A, and WI 85 Series I-Joists
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1. Basis of the product report:
 - 2009 and 2006 International Building Code (IBC): Sections 104.11 Alternative Materials and 2303.1.2 Prefabricated wood I-joists
 - 2009 and 2006 International Residential Code (IRC): Sections R104.11 Alternative Materials and R502.1.4 Prefabricated wood I-joists
 - ASTM D 5055-05 and D 5055-04 recognized by the 2009 IBC and IRC, and 2006 IBC and IRC, respectively
 - 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 and other qualification data
2. Product description:

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

Table 1 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 (www.gp.com/build/product.aspx?pid=1390). For connection design, the specific gravity of the WI flanges shall be limited to 0.42 for WI 40, 0.46 for WI 60 and WI 80 (up to 16"), and 0.55 for WI 80 (greater than 16") and WI 85.
4. Product installation:

WI Series I-joists shall be installed in accordance with the recommendations provided by the manufacturer (see link above). Permissible web holes and cantilever reinforcements 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 (see link above), and with APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (www.apawood.org/publications).
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 (except for 9-1/4 inches), WI 60 (except for 9-1/4 inches), WI 80 (except for 9-1/4, 9-1/2, and 11-1/4 inches), WI 80A, and WI 85 Series I-joists are produced at the Georgia-Pacific Wood Products LLC, Ocala, Florida facilities, and WI 40, WI 60, and WI 80 Series I-joists are produced at the Roxboro, North Carolina facilities 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 (Georgia-Pacific Wood Products LLC) and/or trademark, the APA assigned plant number (1021 for the Ocala plant or 1027 for the Roxboro 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. Design Properties (Allowable Stress Design) for WI Series I-Joists ^(a)

Joist Depth (in.)	Joist Series	EI ^(c) (x10 ⁶ lbf-in. ²)	M ^(d) (lbf-ft)	V ^(e) (lbf)	End Reaction ^(f) (lbf)				Intermediate Reaction (lbf)				C ^(g) (x10 ⁶ ft-lb/in.)	Uniform Vertical Load (lbf/ft)
					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		
9-1/4	WI 40	182	2,680	1,080	1,030	---	1,080	---	2,160	2,485	2,560	3,145	0.401	2,000
	WI 60	219	3,700	1,200	1,100	---	1,200	---	2,300	2,600	2,575	3,160	0.401	2,000
	WI 80	304	5,230	1,325	1,250	---	1,325	---	2,750	3,535	3,345	3,695	0.401	2,000
9-1/2	WI 40	193	2,765	1,200	1,110	---	1,200	---	2,350	2,500	2,575	3,150	0.412	2,000
	WI 60	231	3,805	1,210	1,110	---	1,210	---	2,375	2,645	2,600	3,175	0.412	2,000
	WI 80	324	5,395	1,365	1,255	---	1,365	---	2,755	3,625	3,360	3,735	0.412	2,000
	WI 80A	337	5,635	1,270	1,185	---	1,270	---	3,175	3,750	3,650	3,900	0.412	2,000
11-1/4	WI 60	352	4,640	1,420	1,195	---	1,420	---	2,455	2,720	2,700	3,195	0.488	2,000
	WI 80	485	6,570	1,530	1,280	---	1,530	---	2,865	3,850	3,445	4,005	0.488	2,000
	WI 85 ^(b)	504	6,780	1,675	1,480	1,520	1,600	1,675	3,290	4,100	3,340	4,125	0.649	3,350
11-7/8	WI 40	330	3,585	1,460	1,225	---	1,460	---	2,575	2,645	2,720	3,175	0.515	2,000
	WI 60	396	4,930	1,495	1,230	---	1,495	---	2,590	2,745	2,740	3,200	0.515	2,000
	WI 80	547	6,975	1,555	1,290	---	1,555	---	2,880	4,025	3,475	4,085	0.515	2,000
	WI 80A	573	7,305	1,555	1,305	---	1,555	---	3,225	4,200	3,650	4,225	0.515	2,000
14	WI 40	482	4,315	1,715	1,250	---	1,715	---	2,610	2,790	2,830	3,200	0.607	2,000
	WI 60	584	5,935	1,740	1,335	---	1,740	---	2,625	2,845	2,860	3,225	0.607	2,000
	WI 80	802	8,400	1,800	1,335	---	1,800	---	3,040	4,225	3,575	4,475	0.607	2,000
	WI 80A	842	8,800	1,800	1,410	---	1,800	---	3,400	4,400	3,650	4,475	0.607	2,000
16	WI 40	657	5,005	1,990	1,235	1,500	1,675	1,990	2,650	2,935	2,950	3,225	0.693	2,000
	WI 60	799	6,885	2,000	1,345	1,575	1,675	2,000	2,675	2,945	2,980	3,250	0.693	2,000
	WI 80	1,092	9,740	2,060	1,345	1,770	1,710	2,060	3,200	4,420	3,675	4,725	0.693	2,000
	WI 80A	1,148	10,205	2,060	1,505	1,770	1,710	2,060	3,600	4,650	3,750	4,725	0.693	2,000
18	WI 80	1,507	11,610	2,200	1,420	2,000	1,635	2,200	---	4,875	---	5,000	0.780	1,750
	WI 80A	1,430	10,930	2,200	---	2,000	---	2,200	---	4,610	---	5,000	0.780	1,750
20	WI 80	1,920	13,015	2,280	1,335	2,225	1,560	2,280	---	5,075	---	5,400	0.867	1,750
	WI 80A	1,820	12,095	2,280	---	2,225	---	2,280	---	4,800	---	5,400	0.867	1,750
22	WI 85	2,419	14,230	2,640	---	2,300	---	2,640	---	5,395	---	5,495	1.236	3,350
24	WI 85	2,962	15,615	2,825	---	2,375	---	2,825	---	5,640	---	5,750	1.346	3,350

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 and C, shall be permitted to be adjusted for other load durations as permitted by the code.
- (b) For 11-1/4" WI 85, use 1,465 lbf for allowable end reaction at 1-1/2" bearing length.
- (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" bearing is permitted.
- (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.

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

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