

Products: PWT™ I-joist Series
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1. Basis of the product report:
 - 2021, 2018, 2015, and 2012 International Building Code (IBC): Sections 104.11 Alternative materials and 2303.1.2 Prefabricated wood I-joists
 - 2021, 2018, and 2015 International Residential Code (IRC): Sections 104.11 Alternative materials, R502.1.2 Prefabricated wood I-joists, and R802.1.8 (2021 and 2018 IRC only) Prefabricated wood I-joists.
 - 2012 International Residential Code (IRC): Sections R104.11 Alternative materials and R502.1.4 Prefabricated wood I-joists
 - ASTM D5055-16, D5055-13e1, D5055-13, and D5055-09 recognized in the 2021 IBC and IRC, 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
 - APA PRI-400, Performance Standard for Residential I-joist
 - 2021, 2015, and 2008 ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) recognized in the 2021, 2018 and 2015, and 2012 IBC, respectively
 - APA Reports T2000P-2, T2000P-5, T2001P-25A, T2002P-41, T2003P-58, T2003P-68, T2008P-83, T2008P-84, T2009P-49, T2014P-42, T2014P-43, T2015P-23, T2016P-40, T2021P-10, T2021P-45, T2021P-46, and T2022P-09, and other qualification data
2. Product description:

PWT™ I-joist series, PWI, covered by this report, as described in Table 1, are made with laminated veneer lumber (LVL) flanges and OSB webs in accordance with the in-plant manufacturing standard and quality manual approved by APA.
3. Design properties:

Tables 2a and 2b list the design properties for PWI joists. PWI-47 joists shall be permitted for use in wood-frame diaphragm applications when designed in accordance with Tables 4.2A and 4.2C of the AWC SDPWS as follows:

 - a) The nominal framing width must be limited to 2 inches in the SDPWS tables when the following conditions are met:
 - 1) Nail spacing must be 4 inches or 6 inches on center, and
 - 2) When the nail spacing is 4 inches on center at diaphragm boundaries, adjacent nails within a row at diaphragm boundaries must be offset (staggered) at least 1/2 inch.
 - b) The nominal framing width must be limited to 3 inches in the SDPWS tables when the following conditions are met:
 - 1) Nail spacing must be 4 inches or 6 inches on center,
 - 2) When the nail spacing is 4 inches on center at diaphragm boundaries, adjacent nails within a row at diaphragm boundaries must be offset (staggered) at least 1/2 inch,
 - 3) I-joist floor assembly must be constructed with minimum 1-1/2-inch thick LVL rim boards in the direction perpendicular the I-joist framing, bearing on double 2x6 top wall plates or 2x sill plates, and
 - 4) I-joists must be installed with construction adhesive meeting ASTM D3498 1/8" P/O class between the sheathing and I-joist.

The allowable spans for PWI joists shall be in accordance with the recommendations provided by the manufacturer (www.pwtewp.com).

4. Product installation:
 PWI joists shall be installed in accordance with the recommendations provided by the manufacturer. Table 3 shows web stiffener information. 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, APA Product Report PR-S262, or APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (www.apawood.org/resource-library).

6. Limitations:
 - a) PWI joists shall be designed in accordance with the code using the design properties specified in this report.
 - b) PWI joists are limited to dry service conditions where the average equilibrium moisture content of sawn lumber is less than 16%.
 - c) PWI joists are produced at the PWT manufacturing plant located in Burlington, Washington, under a quality assurance program audited by APA.
 - d) This report is subject to re-examination in one year.

7. Identification:
 PWI joists are sold under the PWT and various private-label brands. Regardless of the brand applied, all PWI joists are identified by a label bearing the manufacturer's name (PWT) and/or trademark, the APA assigned plant number (1048), the I-joist depth and series, the APA logo, the report number PR-L262, and a means of identifying the date of manufacture.

Table 1. Description of PWI Joists^(a)

Joist Series	Joist Depths (in.)	Flanges			Web	
		Material	Dimension		Material	Thickness (in.)
			Depth (in.)	Width (in.)		
PWI-20	7-7/8 – 14	LVL	1-3/8	1-3/4	OSB	3/8
PWI-30	9-1/2 – 11-7/8	LVL	1-1/2	1-1/2	OSB	3/8
PWI-40	9-1/4 – 16	LVL	1-3/8	2-5/16	OSB	3/8
PWI-45	9-1/2 - 16	LVL	1-3/8	2-1/16	OSB	3/8
PWI-47	7-7/8 – 20	LVL	1-1/8	2-5/16	OSB	3/8
PWI-50	9-1/2 – 16	LVL	1-1/2	1-3/4	OSB	3/8
PWI-60	9-1/4 – 16	LVL	1-3/8	2-5/16	OSB	3/8
PWI-70	9-1/2 – 20	LVL	1-1/2	2-5/16	OSB	3/8
PWI-77	9-1/2 – 24	LVL	1-1/2	2-5/16	OSB	7/16
PWI-77w	9-1/2 – 24	LVL	1-1/2	2-1/2	OSB	7/16
PWI-90	9-1/2 – 24	LVL	1-1/2	3-1/2	OSB	7/16

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

Table 2a. Design Properties (Allowable Stress Design) for PWI Joists^(a)

Joist Series	Joist Depth (in.)	EI ^(b) (10 ⁶ lbf-in. ²)	k ^(c) (10 ⁶ lbf)	M ^(d) (ft-lbf)	V ^(e) (lbf)	Uniform Vertical Load ^(f) (plf)
PWI-20	7-7/8	113	4.10	2340	1170	2000
	9-1/2	157	4.94	2520	1330	2000
	11-7/8	267	6.18	3265	1705	2000
	14	392	7.28	3890	1955	2000
PWI-30	9-1/2	161	4.94	3225	1330	2000
	11-7/8	280	6.18	4170	1705	2000
PWI-40	9-1/4	181	4.81	2650	1280	2000
	9-1/2	193	4.94	2735	1330	2000
	11-7/8	330	6.18	3545	1705	2000
	14	482	7.28	4270	1955	2000
	16	657	8.32	4950	2190	2000
PWI-45	9-1/2	193	4.94	3345	1330	2000
	11-7/8	330	6.18	4315	1705	2000
	14	486	7.28	5140	1955	2000
	16	665	8.32	5880	2190	2000
PWI-47	7-7/8	133	4.10	2690	1000	2000
	9-1/2	207	4.94	3565	1330	2000
	11-7/8	345	6.18	4570	1705	2000
	14	501	7.28	5420	1955	2000
	16	677	8.32	6185	2190	2000
	18	878	9.36	6500	2425	1450
	20	1112	10.40	7200	2660	1450
PWI-50	9-1/2	186	4.94	3800	1330	2000
	11-7/8	322	6.18	4915	1705	2000
	14	480	7.28	5860	1955	2000
	16	663	8.32	6715	2190	2000
PWI-60	9-1/4	218	4.81	3665	1280	2000
	9-1/2	231	4.94	3780	1330	2000
	11-7/8	396	6.18	4900	1705	2000
	14	584	7.28	5895	1955	2000
	16	799	8.32	6835	2190	2000
PWI-70	9-1/2	264	4.94	5195	1330	2000
	11-7/8	440	6.18	6730	1705	2000
	14	644	7.28	8030	1955	2000
	16	873	8.32	9200	2190	2000
	18	1141	9.36	10355	2425	1450
PWI-77 PWI-77w	20	1447	10.40	11495	2660	1450
	9-1/2	261	6.08	5155	1430	2400
	11-7/8	442	7.60	6675	1925	2400
	14	648	8.96	7960	2125	2400
	16	881	10.24	9120	2330	2400
	18	1152	11.52	10265	2535	1800
	20	1463	12.80	11395	2740	1800
22	1815	14.08	12520	2935	1300	
24	2209	15.36	13630	3060	1300	

(See footnotes on next page)

Table 2a. Design Properties (Allowable Stress Design) for PWI Joists^(a) (continued)

Joist Series	Joist Depth (in.)	EI ^(b) (10 ⁶ lbf-in. ²)	k ^(c) (10 ⁶ lbf)	M ^(d) (ft-lbf)	V ^(e) (lbf)	Uniform Vertical Load ^(f) (plf)
PWI-90	9-1/2	392	6.08	7915	1430	2400
	11-7/8	661	7.60	10255	1925	2400
	14	965	8.96	12235	2125	2400
	16	1306	10.24	14020	2330	2400
	18	1703	11.52	15780	2535	1800
	20	2155	12.80	17520	2740	1800
	22	2664	14.08	19245	2935	1300
	24	3232	15.36	20955	3060	1300

(a) The tabulated values are design values for normal duration of load. All values, except for EI, k and vertical load capacity shall be permitted to be adjusted for other load duration as permitted by the code.

(b) Bending stiffness.

(c) Coefficient of shear deflection. For calculating uniform load and center point load deflections of an I-joist in a simple-span application, use Equations 1 and 2.

$$\text{Uniform Load: } \delta = \frac{5 w \ell^4}{384 EI} + \frac{w \ell^2}{k} \quad [1]$$

$$\text{Center-Point Load: } \delta = \frac{P \ell^3}{48 EI} + \frac{2 P \ell}{k} \quad [2]$$

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

(d) Moment capacity.

(e) Shear capacity.

(f) Blocking panel and rim joist uniform vertical load capacity (plf).

Table 2b. Design Properties (Allowable Stress Design) for PWI Joists

Joist Series	Joist Depth (in.)	ER ^(a) (lbf)		IR ^(b) (lbf)		WS ^(c) Nails	b _{EFF} ^(d) (in.)
		No Web Stiffeners	With Web Stiffeners	No Web Stiffeners	With Web Stiffeners		
PWI-20	7-7/8	0.0 × l _b + 900	0.0 × l _b + 900	0.0 × l _b + 1800	0.0 × l _b + 1800	4	1.62
	9-1/2	117.1 × l _b + 710	0.0 × l _b + 1120	142.9 × l _b + 1490	0.0 × l _b + 2240	4	
	11-7/8	222.9 × l _b + 525	0.0 × l _b + 1420	245.7 × l _b + 1130	211.4 × l _b + 1535	4	
	14	222.9 × l _b + 525	97.1 × l _b + 1370	245.7 × l _b + 1130	211.4 × l _b + 1535	4	
PWI-30	9-1/2	77.7 × l _b + 809	77.7 × l _b + 809	0.0 × l _b + 1905	0.0 × l _b + 1905	4	1.37
	11-7/8	210.9 × l _b + 576	210.9 × l _b + 576	0.0 × l _b + 1905	0.0 × l _b + 1905	4	
PWI-40	9-1/4	0.0 × l _b + 1080	0.0 × l _b + 1080	0.0 × l _b + 2160	0.0 × l _b + 2160	4	2.18
	9-1/2	22.9 × l _b + 1040	0.0 × l _b + 1120	0.0 × l _b + 2240	0.0 × l _b + 2240	4	
	11-7/8	194.3 × l _b + 740	0.0 × l _b + 1420	291.4 × l _b + 1310	0.0 × l _b + 2840	4	
	14	200.0 × l _b + 730	0.0 × l _b + 1710	291.4 × l _b + 1310	205.7 × l _b + 2120	4	
PWI-45	16	200.0 × l _b + 730	0.0 × l _b + 1970	291.4 × l _b + 1310	257.1 × l _b + 2250	8	1.93
	9-1/2	80.0 × l _b + 840	0.0 × l _b + 1120	0.0 × l _b + 2240	0.0 × l _b + 2240	4	
	11-7/8	245.7 × l _b + 550	0.0 × l _b + 1420	180.0 × l _b + 1620	137.1 × l _b + 2120	4	
	14	245.7 × l _b + 550	80.0 × l _b + 1430	180.0 × l _b + 1620	240.0 × l _b + 1760	4	
PWI-47	16	245.7 × l _b + 550	228.6 × l _b + 1170	180.0 × l _b + 1620	240.0 × l _b + 1760	8	2.18
	7-7/8	171.4 × l _b + 565	14.3 × l _b + 1085	222.9 × l _b + 1030	168.6 × l _b + 1535	4	
	9-1/2	228.6 × l _b + 530	48.6 × l _b + 1160	202.9 × l _b + 1435	162.9 × l _b + 1730	4	
	11-7/8	254.3 × l _b + 515	17.1 × l _b + 1410	254.3 × l _b + 1260	157.1 × l _b + 2005	4	
	14	237.1 × l _b + 575	20.0 × l _b + 1580	300.0 × l _b + 1105	151.4 × l _b + 2250	4	
	16	222.9 × l _b + 520	22.9 × l _b + 1740	191.4 × l _b + 1390	145.7 × l _b + 2485	8	
PWI-50	18	234.3 × l _b + 510	22.9 × l _b + 1905	182.9 × l _b + 1480	140.0 × l _b + 2720	8	1.62
	20	248.6 × l _b + 495	25.7 × l _b + 2065	177.1 × l _b + 1560	134.3 × l _b + 2955	10	
	9-1/2	46.9 × l _b + 933	46.9 × l _b + 933	0.0 × l _b + 2040	0.0 × l _b + 2040	4	
	11-7/8	180.0 × l _b + 700	180.0 × l _b + 700	0.0 × l _b + 2040	0.0 × l _b + 2040	4	
PWI-60	14	164.6 × l _b + 727	213.7 × l _b + 641	0.0 × l _b + 2040	0.0 × l _b + 2040	4	2.18
	16	164.6 × l _b + 727	293.7 × l _b + 501	0.0 × l _b + 2040	0.0 × l _b + 2040	8	
	9-1/4	0.0 × l _b + 1080	0.0 × l _b + 1080	0.0 × l _b + 2160	0.0 × l _b + 2160	4	
	9-1/2	22.9 × l _b + 1040	0.0 × l _b + 1120	0.0 × l _b + 2240	0.0 × l _b + 2240	4	
PWI-70	11-7/8	194.3 × l _b + 740	0.0 × l _b + 1420	291.4 × l _b + 1310	0.0 × l _b + 2840	4	2.18
	14	200.0 × l _b + 730	0.0 × l _b + 1710	291.4 × l _b + 1310	205.7 × l _b + 2120	4	
	16	200.0 × l _b + 730	0.0 × l _b + 1970	291.4 × l _b + 1310	257.1 × l _b + 2250	8	
	9-1/2	0.0 × l _b + 1120	0.0 × l _b + 1120	0.0 × l _b + 2240	0.0 × l _b + 2240	4	
PWI-70	11-7/8	148.6 × l _b + 900	0.0 × l _b + 1420	217.1 × l _b + 1700	0.0 × l _b + 2840	4	2.18
	14	260.0 × l _b + 705	67.4 × l _b + 1474	308.6 × l _b + 1380	154.3 × l _b + 2610	4	
	16	260.0 × l _b + 705	216.0 × l _b + 1214	308.6 × l _b + 1380	257.1 × l _b + 2250	8	
	18	260.0 × l _b + 705	246.3 × l _b + 1377	308.6 × l _b + 1380	342.9 × l _b + 2300	8	
	20	260.0 × l _b + 705	260.0 × l _b + 1353	308.6 × l _b + 1380	342.9 × l _b + 2300	10	

(See footnotes on next page)

Table 2b. Design Properties (Allowable Stress Design) for PWI Joists (continued)

Joist Series	Joist Depth (in.)	ER ^(a) (lbf)		IR ^(b) (lbf)		WS ^(c) Nails	b _{EFF} ^(d) (in.)
		No Web Stiffeners	With Web Stiffeners	No Web Stiffeners	With Web Stiffeners		
PWI-77 PWI-77w	9-1/2	82.9 × ℓ _b + 1140	0.0 × ℓ _b + 1430	94.3 × ℓ _b + 2365	0.0 × ℓ _b + 2860	4	2.18
	11-7/8	271.4 × ℓ _b + 810	20.0 × ℓ _b + 1855	260.0 × ℓ _b + 1785	345.7 × ℓ _b + 1820	4	
	14	271.4 × ℓ _b + 810	134.3 × ℓ _b + 1655	260.0 × ℓ _b + 1785	345.7 × ℓ _b + 1820	4	
	16	271.4 × ℓ _b + 810	251.4 × ℓ _b + 1450	260.0 × ℓ _b + 1785	345.7 × ℓ _b + 1820	8	
	18	271.4 × ℓ _b + 810	225.7 × ℓ _b + 1745	260.0 × ℓ _b + 1785	194.3 × ℓ _b + 3090	8	
	20	271.4 × ℓ _b + 810	291.4 × ℓ _b + 1630	260.0 × ℓ _b + 1785	194.3 × ℓ _b + 3090	10	
	22	NA	291.4 × ℓ _b + 1880	NA	171.4 × ℓ _b + 3525	10	
	24	NA	291.4 × ℓ _b + 1880	NA	171.4 × ℓ _b + 3525	10	
PWI-90	9-1/2	17.1 × ℓ _b + 1370	0.0 × ℓ _b + 1430	0.0 × ℓ _b + 2860	0.0 × ℓ _b + 2860	4	3.37
	11-7/8	285.7 × ℓ _b + 900	14.3 × ℓ _b + 1875	282.9 × ℓ _b + 2365	0.0 × ℓ _b + 3850	4	
	14	285.7 × ℓ _b + 900	128.6 × ℓ _b + 1675	351.4 × ℓ _b + 2125	225.7 × ℓ _b + 3065	4	
	16	285.7 × ℓ _b + 900	245.7 × ℓ _b + 1470	351.4 × ℓ _b + 2125	351.4 × ℓ _b + 2625	8	
	18	285.7 × ℓ _b + 900	220.0 × ℓ _b + 1765	351.4 × ℓ _b + 2125	351.4 × ℓ _b + 3125	8	
	20	285.7 × ℓ _b + 900	285.7 × ℓ _b + 1650	351.4 × ℓ _b + 2125	351.4 × ℓ _b + 3125	10	
	22	142.9 × ℓ _b + 1050	285.7 × ℓ _b + 1900	231.4 × ℓ _b + 2320	351.4 × ℓ _b + 3375	10	
	24	142.9 × ℓ _b + 1050	285.7 × ℓ _b + 1900	231.4 × ℓ _b + 2320	351.4 × ℓ _b + 3375	10	

- (a) End reaction capacity for 1-3/4 inches ≤ ℓ_b ≤ 3-1/2 inches, where ℓ_b is the bearing length in inches. ER shall not exceed V as listed in Table 2a. See also Footnote (d).
- (b) Intermediate reaction capacity for 3-1/2 inches ≤ ℓ_b ≤ 5-1/4 inches, where ℓ_b is the bearing length in inches. IR shall not exceed 2V, where V is listed in Table 2a. See also Footnote (d).
- (c) Number of nails needed for web stiffeners, refer to Table 3 for web stiffener and nail dimensions.
- (d) After adjustment for pertinent load duration, ER shall not exceed b_{EFF} × ℓ_b × F_{C⊥} and IR shall not exceed b_{EFF} × ℓ_b × F_{C⊥} × C_b, where b_{EFF} is the effective width of the flange in inches, ℓ_b is the bearing length in inches, F_{C⊥} is the reference compression design value perpendicular to grain in pounds per square inch and C_b = (ℓ_b + 0.375) ÷ ℓ_b. For the LVL flanges, F_{C⊥} = 650 psi. Do not adjust F_{C⊥} for load duration when using the equation provided in this footnote. Compression of the support surface must also be checked.

Table 3. Minimum Dimensions for Web Stiffeners and Accompanying Nails^(a)

Flange Width (in.)	Minimum Dimensions (in.)		
	Web Stiffeners		Nails
	Thickness	Width	
1-1/2	15/32	2-5/16	2-1/2 x 0.131
1-3/4	19/32	2-5/16	2-1/2 x 0.131
2-1/16	23/32	2-5/16	2-1/2 x 0.131
2-5/16	23/32	2-5/16	2-1/2 x 0.131
2-1/2	23/32	2-5/16	2-1/2 x 0.131
3-1/2	1-1/2	3-1/2	3-1/4 x 0.131

^(a) Web stiffener length is approximately 1/8 inch less than the clear distance between flanges.

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