APA PRODUCT REPORT®

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PWI Joists
Pacific Woodtech Corporation

PR-L262

Revised December 12, 2018

Products: PWI-20, 30, 40, 45, 47, 50, 60, 70, 77, 77w, and 90 Series I-joists
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1. Basis of the product report:
   - 2018, 2015, and 2012 International Building Code (IBC): Sections 104.11 Alternative materials and 2303.1.2 Prefabricated wood I-joists
   - 2018 and 2015 International Residential Code (IRC): Sections 104.11 Alternative materials and R502.1.2 Prefabricated wood I-joists and R802.1.8 (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 D5055-13e1, D5055-13, and D5055-09 recognized by the 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
   - Performance Standard for APA EWS I-joist, PRI-400
   - AWC SDPWS-2015 Special Design Provisions for Wind and Seismic
   - 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, and T2016P-40, and other qualification data

2. Product description:
   PWI joists 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 except that the nails shall not be placed closer than 4 inches on center, the nominal framing width shall be limited to 2 inches in the SDPWS tables, and when the nail spacing is less than 6 inches on center at diaphragm boundaries, adjacent nails within a row must be offset (staggered) 1/2 inch. The allowable spans for PWI joists shall be in accordance with the recommendations provided by the manufacturer (https://pacificwoodtech.com/pwi-joist/).

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 percent.
c) PWI joists are produced at the Pacific Woodtech Corporation 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 Pacific Woodtech and various private-label brands. Regardless of the brand applied, all PWI joists are identified by a label bearing the manufacturer's name (Pacific Woodtech) 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	9-1/2 – 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	11-7/8 – 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	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	206	4.94	3335	1330	2000
	11-7/8	344	6.18	4280	1705	2000
	14	499	7.28	5075	1955	2000
	16	674	8.32	5790	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	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
	20	1447	10.40	11495	2660	1450
PWI-77 PWI-77w	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

Footnotes to Table 2a:

[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.

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

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	9-1/2	117.1 × ℓ_b + 710	0.0 × ℓ_b + 1120	142.9 × ℓ_b + 1490	0.0 × ℓ_b + 2240	4	1.62
	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	
	16	200.0 × ℓ_b + 730	0.0 × ℓ_b + 1970	291.4 × ℓ_b + 1310	257.1 × ℓ_b + 2250	8	
PWI-45	9-1/2	80.0 × ℓ_b + 840	0.0 × ℓ_b + 1120	0.0 × ℓ_b + 2240	0.0 × ℓ_b + 2240	4	1.93
	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	
	16	245.7 × ℓ_b + 550	228.6 × ℓ_b + 1170	180.0 × ℓ_b + 1620	240.0 × ℓ_b + 1760	8	
PWI-47	7-7/8	171.4 × ℓ_b + 565	14.3 × ℓ_b + 1085	222.9 × ℓ_b + 1030	168.6 × ℓ_b + 1535	4	2.18
	9-1/2	180.0 × ℓ_b + 560	14.3 × ℓ_b + 1220	217.1 × ℓ_b + 1100	162.9 × ℓ_b + 1730	4	
	11-7/8	197.1 × ℓ_b + 540	17.1 × ℓ_b + 1410	208.6 × ℓ_b + 1200	157.1 × ℓ_b + 2005	4	
	14	208.6 × ℓ_b + 535	20.0 × ℓ_b + 1580	200.0 × ℓ_b + 1295	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	
	18	234.3 × ℓ_b + 510	22.9 × ℓ_b + 1905	182.9 × ℓ_b + 1480	140.0 × ℓ_b + 2720	8	
	20	248.6 × ℓ_b + 495	25.7 × ℓ_b + 2065	177.1 × ℓ_b + 1560	134.3 × ℓ_b + 2955	10	
PWI-50	9-1/2	46.9 × ℓ_b + 933	46.9 × ℓ_b + 933	0.0 × ℓ_b + 2040	0.0 × ℓ_b + 2040	4	1.62
	11-7/8	180.0 × ℓ_b + 700	180.0 × ℓ_b + 700	0.0 × ℓ_b + 2040	0.0 × ℓ_b + 2040	4	
	14	164.6 × ℓ_b + 727	213.7 × ℓ_b + 641	0.0 × ℓ_b + 2040	0.0 × ℓ_b + 2040	4	
	16	164.6 × ℓ_b + 727	293.7 × ℓ_b + 501	0.0 × ℓ_b + 2040	0.0 × ℓ_b + 2040	8	
PWI-60	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	
	16	200.0 × ℓ_b + 730	0.0 × ℓ_b + 1970	291.4 × ℓ_b + 1310	257.1 × ℓ_b + 2250	8	
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	

Footnotes to Table 2b:

(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 $b_{EFF} \times \ell_b \times F_{c\perp}$ and IR shall not exceed $b_{EFF} \times \ell_b \times F_{c\perp} \times C_b$, where b_{EFF} is the effective width of the flange in inches, ℓ_b is the bearing length in inches, $F_{c\perp}$ is the reference compression design value perpendicular to grain in pounds per square inch and $C_b = (\ell_b + 0.375) \div \ell_b$. For the LVL flanges, $F_{c\perp}$ = 650 psi. Do not adjust $F_{c\perp}$ 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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