

Filing Category: DESIGN—Wood

PACIFIC WOODTECH CORPORATION PWI JOISTS

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CANADA

1.0 SUBJECT

Pacific Woodtech Corporation (PWC) private label I-joists: Franklin FBI, Georgia-Pacific Wood I Beam®, Roseburg RFPI™, Capital CCI, and Weldwood™ I-joists.

2.0 DESCRIPTION

2.1 General:

Pacific Woodtech Corporation (PWC) manufactures private-label I-joists. Private labels include, but are not limited to, Franklin FBI, Georgia-Pacific Wood I Beam®, Roseburg RFPI™, Capital CCI, and Weldwood™ I-joists. All I-joists are identified by the designation "PWC" and the evaluation report number (PFC-5804). The PWI joists described in this report are prefabricated wood I-joists that comply with Section 2303, Item 5.1, in the 1997 *Uniform Building Code*™ (UBC), Section 2303.1.2 of the 2000 *International Building Code*® (IBC) and Section R502.1.4 of the 2000 *International Residential Code*® (IRC), for allowable stress design; Section 2313.5 of the BOCA® *National Building Code*/1999; and Section 2301.4.11 of the 1999 *Standard Building Code*®.

PWI joists are manufactured to meet the performance standard recognized in PFC-5317 (PRI-400, *Performance Standard for APA EWS I-joists*), and/or the Pacific Woodtech Corporation *I-Joist Quality Control Manual*. The PWI joists consist of laminated veneer lumber (LVL) or machine stress rated (MSR) lumber flanges and oriented strand board (OSB) webs.

Flange stock used to fabricate the PWI joists is LVL (Douglas fir) or MSR (spruce-pine-fir) lumber of the grade required by the Pacific Woodtech Corporation quality control manual.

Webs are structural use panels that comply with evaluation report ER-5681 and the approved quality control manual. The web sections are made up of minimum 8-foot-long (2438 mm) elements that are edge-glued to form a continuous web using a tongue-and-groove joint. The web-to-flange glued connection is made by inserting the web into a groove in the center of the flange face.

Exterior-type adhesives, complying with ASTM D 2559, are used for flange-flange, flange-web and web-web joints.

Descriptive details for the joists are noted in Table 1.

2.2 Installation:

2.2.1 Web Stiffeners: Web stiffeners are not required, with the following exceptions: (1) Web stiffeners are required at the ends of the I-joist in joist hangers that are not deep enough to laterally support the top flange of the joist. Refer to the hanger installation instructions. (2) Web stiffeners are required to accommodate special hanger nailing requirements. Refer to the hanger installation instructions. (3) Web stiffeners are required under concentrated loads applied to the top of the I-joist between supports, or along cantilevers beyond the support, when the concentrated load exceeds 1500 pounds (6672 N). (4) Web stiffeners are required at birdsmouth cuts at the low end support of sloped joists. (5) Web stiffeners are required for high reactions at supports. See Table 2. See Figure 1 for illustrations as well as web stiffener dimensions and nail sizes.

2.2.2 Lateral Support: The compression flange must be laterally supported in accordance with the applicable code, and beam-ends must be restrained to prevent rotation. Diaphragm sheathing must be attached to the top flange and to an end wall or shear-transfer panel capable of transferring a minimum force of 50 pounds per foot (730 N/m).

2.2.3 Web Holes: Tables 4 and 5 provide allowable locations for round, rectangular and duct holes in joists sized by means of Table 3. For engineered designs, refer to *Tables 4 & 5 Notes* and use the following allowable hole shear values:

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$$\text{Round holes: } V_{\text{hole}} = \frac{d - \text{Hole Diameter (inches)}}{d} \times V_{\text{joist}}$$

where:

V_{hole} = allowable joist shear at web hole [lbs].

d = joist depth [inches].

V_{joist} = allowable joist shear [lbs].

Rectangular holes: Substitute the longest side dimension divided by 0.75 for *Hole Diameter* in the round hole equation.

Duct holes (full height of web removed):

Series 20/30 $V_{\text{hole}} = 300 - 8.5 \times \text{Width}$

Series 50 $V_{\text{hole}} = 360 - 11 \times \text{Width}$

Series 40/60/70/77 $V_{\text{hole}} = 430 - 11.5 \times \text{Width}$

Series 80/90/93 $V_{\text{hole}} = 515 - 12 \times \text{Width}$

where:

V_{hole} = allowable joist shear at web hole [lbs].

Width = duct hole width [inches].

2.2.4 Other: Installation and construction details not specifically covered herein must be in accordance with evaluation report PFC-5317.

2.3 Design:

Allowable design properties are noted in Table 2. The tabulated moment capacity may be increased by a repetitive member factor of 1.04 for LVL flanges or 1.07 for MSR lumber flanges when joists or rafters are in contact or spaced not more than 24 inches (610 mm) on center, are not less than three in number and are joined by floor or roof sheathing, or other load distributing elements adequate to support the design load. Moment and shear capacity are permitted to be increased for duration of load in accordance with the applicable code.

2.4 One-hour Fire-resistive Construction for Roof-ceiling and Floor-ceiling Assemblies:

2.4.1 Assembly 1: The I-joists described in this evaluation report, with minimum flange size of 1½ inches (38 mm) by 2½ inches (63.5 mm), can be used with the assembly described in Figure 7 of PFC-5317.

2.4.2 Assembly 2: I-joists can be used in the construction of the assembly described in Table 7-C, Item 21-1.1, of the UBC; or Table 719.1(3), Item 21-1.1, of the IBC. Minimum 9½-inch-deep (241 mm) wood I-joists must be spaced a maximum of 24 inches (610 mm) on center. Minimum flange size is 1⅝ inches thick by 1½ inches wide (33 mm by 38 mm). Minimum web thickness is ⅜ inches (9.5 mm).

2.4.3 Assembly 3: The I-joists described in this evaluation report can be used with the assembly details described in Section 2.3.3 of PFC-5317.

2.4.4 Assembly 4:

Finish flooring (optional)—Hardwood or softwood flooring on building paper; or resilient flooring, parquet floor, felt-synthetic-fiber floor coverings, carpeting, or ceramic tile on ⅜-inch-thick (9.5 mm) panel-type underlay; or ceramic tile on 1¼ inch (32 mm) mortar bed.

Subfloor—Wood structural panel sheathing in compliance with the provisions of PS1 or PS2 and the applicable building code.

Wood structural members—Minimum 9½-inch-deep (241 mm) wood I-joists spaced a maximum of 24 inches (610 mm) on center. Minimum flange size is 1½ inches thick by 1½ inches wide (38 mm by 38 mm). Minimum web thickness is ⅜ inches (9.5 mm).

Insulation (optional)—3½-inch (89 mm) glass fiber batts, or 3½-inch (89 mm) mineral wool batts.

Resilient channels—Minimum 0.018-inch-thick (0.46 mm) resilient channels are installed in continuous rows at a maximum spacing of 24 inches (610 mm) on center and are perpendicular to the joists. Attached to the bottom of each joist with a 1¼-inch-long (32 mm) screw. Additional channels may be installed between continuous rows at the locations of end joints in the first layer of ceiling. Extend the additional channel a minimum of 2 inches (51 mm) beyond the joists adjacent to each side of the gypsum board panels in the first layer of ceiling.

Ceiling—Two layers of ½-inch-thick (12.7 mm), Type X gypsum board in compliance with ASTM C 36. Long edge of both layers must be perpendicular to the channels (parallel to the joists). End and side joints must be staggered at least 16 inches (406 mm) from layer to layer. The first layer is fastened to the resilient channels with 1¼-inch (32 mm), Type S screws at 12 inches (305 mm) on center. Screws must be installed a minimum of ⅜ inch (9.5 mm) from end joints and a minimum of 1½ inches (38 mm) from side joints. The second layer must be fastened to the resilient channels with 1⅝-inch (41 mm), Type S screws at 12 inches (305 mm) on center. Screws must be installed a minimum of ½ inch (12.7 mm) from end and side joints. 1½-inch (38 mm), Type G screws may be substituted at end joints in the second layer when end joints fall between channels.

2.5 Identification:

Each I-joist shall be marked with the product trade name or trademark, the joist series, the production date, the evaluation report number (PFC-5804), the name or trademark of the quality assurance agency (APA-EWS), the manufacturer (PWC) and the manufacturer's APA mill number (1048).

3.0 EVIDENCE SUBMITTED

Product description; structural design calculations; in-plant quality control manual; results of full-scale tests and data showing compliance with the ICBO ES Acceptance Criteria for Prefabricated Wood I-joists (AC14), dated July 2000, and the APA Product Standard PRI-400, Performance Standard for APA EWS I-joists; and copies of PRI-400 and the APA Quality Assurance Policy.

4.0 FINDINGS

That the Pacific Woodtech PWI joists described in this report comply with the 1997 Uniform Building Code™, the 2000 International Building Code®, the 2000 International Residential Code®, the BOCA® National Building Code/1999 and the 1999 Standard Building Code®, subject to the following conditions:

4.1 I-joists are manufactured at the Pacific Woodtech facility in Burlington, Washington, with quality control inspections by APA-EWS (AA-649-1).

4.2 Allowable residential floor spans are in accordance with Table 3.

4.3 Design calculations and details for specific applications are furnished to the code official upon request, verifying compliance with this report and the applicable code.

4.4 I-joists are permitted in dry-use service conditions only.

4.5 Cutting of flanges is not permitted.

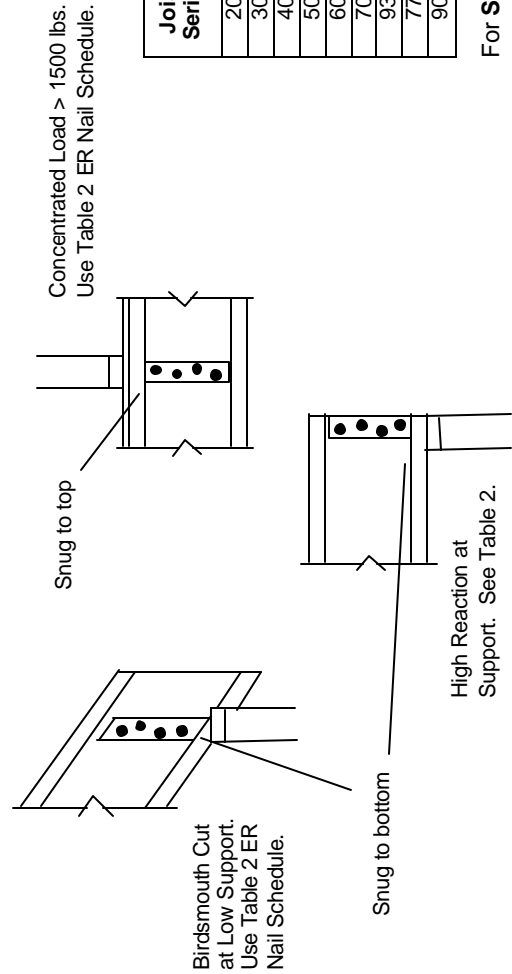
This report is subject to re-examination in one year.

Table 1 – Joist Descriptions

Joist Series	Joist Depths [in]		Material	Flange		Web	
	PWC ⁽²⁾	Maximum		Width [in]	Depth [in]	Material	Thickness [in]
PR1-400 ⁽¹⁾							
PR1-20	PWI-20	11-7/8	LVL	1 3/4	1 3/8	OSB	3/8
PR1-30	PWI-30	11-7/8	LVL	1 1/2	1 1/2	OSB	3/8
PR1-40	PWI-40	16	LVL	2 5/16	1 3/8	OSB	3/8
PR1-40	PWI-40	16	LVL	2 1/2	1 3/8	OSB	3/8
PR1-40	PWI-40	16	MSR	2 1/2	1 1/2	OSB	3/8
PR1-50	PWI-50	16	LVL	1 3/4	1 1/2	OSB	3/8
PR1-60	PWI-60	16	LVL	2 5/16	1 3/8	OSB	3/8
PR1-60	PWI-60	16	LVL	2 1/2	1 3/8	OSB	3/8
PR1-60	PWI-60	16	MSR	2 1/2	1 1/2	OSB	3/8
-	PWI-70	20	LVL	2 5/16	1 1/2	OSB	3/8
-	PWI-93	16	LVL	3 1/2	1 1/2	OSB	3/8
-	PWI-77	20	LVL	2 5/16	1 1/2	OSB	7/16
-	PWI-90	24	LVL	3 1/2	1 1/2	OSB	7/16

For **SI**: 1 inch = 25.4 mm.

1. PR1-400 Performance Standard for APA EWS I-Joists (PFC-5317)
2. Pacific Woodtech Corporation



Joist Series	Minimum Dimensions	
	Web Stiffeners	Nails
20	Thick. 19/32" Min. 2-5/16"	2 1/2" x 0.131"
30	15/32" 1"	2 1/2" x 0.131"
40	1"	2 1/2" x 0.131"
50	19/32" 1"	2 1/2" x 0.131"
60	1"	2 1/2" x 0.131"
70	1"	2 1/2" x 0.131"
93	1-1/2"	3 1/2" x 0.131"
77	1"	2 1/2" x 0.131"
90	1 1/2"	3 1/2" x 0.131"

For **SI**: 1 inch = 25.4 mm.

Figure 1

Table 2 – Design Properties ⁽¹⁾

Joist Series	Joist Depth	EI [x 10 ⁶ lb-in ²]	k ⁽⁵⁾ [x 10 ⁶ lbs]	M ⁽⁶⁾ [ft-lbs]		V ⁽⁷⁾ [lbs]	ER ⁽⁸⁾ [lbs]			IR ⁽⁹⁾ [lbs]			WS ⁽¹⁰⁾ Nails	
				LVL	MSR		No WS	WS	No WS	WS	No WS	WS		
PRI-20	9-1/2"	145	4.94	2180	-	1120	830	N.A.	1056	N.A.	1700	N.A.	N.A.	4
	11-7/8"	253	6.18	2910	-	1420	830	N.A.	1289	N.A.	1700	N.A.	N.A.	4
PRI-30	9-1/2"	161	4.94	2800	-	1120	945	N.A.	1081	N.A.	1905	N.A.	N.A.	4
	11-7/8"	280	6.18	3715	-	1420	945	N.A.	1314	N.A.	1905	N.A.	N.A.	4
PRI-40	9-1/2"	193	4.94	2423	2355	1120	1080	N.A.	1111	N.A.	2160	N.A.	N.A.	4
	11-7/8"	330	6.18	3236	3145	1420	1200	N.A.	1371	N.A.	2500	N.A.	N.A.	4
	14"	482	7.28	3971	3860	1710	1200	N.A.	1472	1597	2500	N.A.	N.A.	4
	16"	657	8.32	4666	4535	1970	1200	N.A.	1472	1799	2500	N.A.	N.A.	4
PRI-50	9-1/2"	186	4.94	3290	-	1120	1015	N.A.	1097	N.A.	2040	N.A.	N.A.	4
	11-7/8"	322	6.18	4375	-	1420	1015	N.A.	1330	N.A.	2040	N.A.	N.A.	4
	14"	480	7.28	5350	-	1710	1015	N.A.	1303	1389	2040	N.A.	N.A.	4
	16"	663	8.32	6270	-	1970	1015	N.A.	1303	1529	2040	N.A.	N.A.	4
PRI-60	9-1/2"	231	4.94	3339	3245	1120	1080	N.A.	1111	N.A.	2160	N.A.	N.A.	4
	11-7/8"	396	6.18	4460	4335	1420	1200	N.A.	1371	N.A.	2500	N.A.	N.A.	4
	14"	584	7.28	5473	5320	1710	1200	N.A.	1472	1597	2500	N.A.	N.A.	4
	16"	799	8.32	6430	6250	1970	1200	N.A.	1472	1799	2500	N.A.	N.A.	4
	11-7/8"	440	6.19	5945	-	1420	1160	1420	1420	N.A.	2335	2767	2840	4
	14"	644	7.33	7295	-	1710	1160	1592	1615	1710	2335	2767	2870	4
	16"	873	8.42	8570	-	1970	1160	1592	1615	1970	2335	2767	2870	4
	18"	1141	9.53	9850	-	2239	1160	1808	1615	2239	2335	3199	2870	8
	20"	1447	10.63	11135	-	2506	1160	1808	1615	2263	2335	3199	2870	8
	11-7/8"	659	6.18	8580	-	1420	1280	N.A.	1389	N.A.	2760	N.A.	N.A.	4
	14"	961	7.28	10530	-	1710	1280	N.A.	1490	1614	3020	N.A.	N.A.	4
	16"	1301	8.32	12360	-	1970	1280	N.A.	1490	1817	3020	N.A.	N.A.	4
	9-1/2"	261	5.57	4450	-	1675	1390	1675	1675	N.A.	2780	N.A.	3350	4
	11-7/8"	442	6.92	5945	-	1925	1390	1890	1885	1925	2780	3280	3395	4
	14"	648	8.17	7295	-	2125	1390	1890	1885	2125	2780	3280	3395	4
	16"	881	9.35	8570	-	2330	1390	1890	1885	2330	2780	3280	3395	4
	18"	1152	10.55	9850	-	2535	1390	2140	1885	2535	2780	3280	3395	8
	20"	1463	11.76	11135	-	2740	1390	2140	1885	2635	2780	3280	3395	8
	9-1/2"	392	5.57	6800	-	1675	1400	1675	1675	N.A.	3350	N.A.	3350	4
	11-7/8"	661	6.92	9095	-	1925	1400	1900	1900	1925	3350	3850	3850	4
	14"	965	8.17	11165	-	2125	1400	1900	1900	2125	3350	3850	3970	4
	16"	1306	9.35	13120	-	2330	1400	1900	1900	2330	3350	3850	3970	4
	18"	1703	10.55	15085	-	2535	1400	2150	1900	2535	3350	4355	3970	8
	20"	2155	11.76	17055	-	2740	1400	2150	1900	2650	3350	4355	3970	8
	22"	2664	12.97	19025	-	2935	N.A.	2400	N.A.	2900	N.A.	4605	N.A.	10
	24"	3232	14.18	20995	-	3060	N.A.	2400	N.A.	2900	N.A.	4605	N.A.	10

SI: 1 inch = 25.4 mm, 1 ft-lb = 1.35 N-m, 1 lb-in² = 179 N-mm², 1 lb = 4.45 N

Table 2 - Notes

1. The tabulated values are design values for normal duration of load. All values, except for EI and k, shall be permitted to be adjusted for other load duration as permitted by the code.
2. PRI-400 Performance Standard for APA EWS I-Joists
3. Pacific Woodtech Corporation
4. Bending stiffness (EI) of the I-joist.
5. Coefficient of shear deflection (k). For calculating uniform load and center point load deflections of an Ijoist in a simple-span application, use Equations 1 and 2.

$$\text{Uniform Load:} \quad d = \frac{5w^4}{384EI} + \frac{w^2}{k} \quad (1)$$

$$\text{Center Point Load:} \quad d = \frac{Pl^3}{48EI} + \frac{2Pl}{k} \quad (2)$$

Where:

d = calculated deflection (in)

w = uniform load (lbs/in)

l = design span (in)

P = concentrated load (lbs)

EI = bending stiffness of the I-joist (lbs-in²)

k = coefficient of shear deflection (lbs)

6. Moment capacity (M) of the I-joist. For repetitive I-joists, the tabulated values may be increased by a factor of 1.04 for LVL flanges or 1.07 for MSR lumber flanges.
7. Shear capacity (V) of the I-joist.
8. End reaction capacity (ER) of the I-joist, for 1-1/2" and 3-1/2" bearing lengths, with (WS) and without web stiffeners (No WS).
9. Intermediate reaction capacity (IR) of the I-joist, for 3-1/2" and 5-1/4" bearing lengths, with (WS) and without web stiffeners (No WS).
10. Refer to Figure 1 for minimum nail dimensions.

Table 3 – Allowable Residential Floor Joist Spans⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾

Joist Series		Joist Depth	Simple Span				Continuous Span (two or more spans)			
PRI-400 ⁽⁵⁾	PWC ⁽⁶⁾		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
PRI-20	PWI-20	9-1/2"	16'-7"	15'-2"	14'-4"	13'-4"	18'-1"	16'-3"	14'-10"	13'-3"
		11-7/8"	19'-10"	18'-2"	17'-2"	15'-5"	21'-8"	18'-10"	16'-9"	13'-5"
PRI-30	PWI-30	9-1/2"	17'-1"	15'-8"	14'-10"	13'-10"	18'-7"	17'-0"	16'-1"	15'-0"
		11-7/8"	20'-6"	18'-9"	17'-8"	16'-6"	22'-4"	20'-5"	18'-10"	15'-0"
PRI-40	PWI-40	9-1/2"	18'-0"	16'-5"	15'-6"	14'-1"	19'-7"	17'-2"	15'-8"	14'-0"
		11-7/8"	21'-5"	19'-7"	18'-2"	16'-3"	23'-0"	19'-11"	18'-2"	16'-2"
		14"	24'-4"	22'-1"	20'-2"	18'-0"	25'-6"	22'-1"	20'-1"	18'-0"
		16"	26'-11"	24'-0"	21'-11"	19'-7"	27'-8"	23'-11"	21'-10"	19'-6"
PRI-50	PWI-50	9-1/2"	17'-10"	16'-4"	15'-5"	14'-5"	19'-5"	17'-9"	16'-9"	15'-7"
		11-7/8"	21'-4"	19'-6"	18'-5"	17'-2"	23'-3"	21'-2"	20'-0"	16'-1"
		14"	24'-4"	22'-2"	21'-0"	19'-7"	26'-6"	24'-2"	20'-2"	16'-1"
		16"	27'-0"	24'-8"	23'-4"	20'-2"	29'-6"	24'-3"	20'-2"	16'-1"
PRI-60	PWI-60	9-1/2"	18'-11"	17'-4"	16'-4"	15'-3"	20'-8"	18'-10"	17'-9"	16'-5"
		11-7/8"	22'-7"	20'-8"	19'-6"	18'-2"	24'-8"	22'-6"	21'-2"	19'-1"
		14"	25'-9"	23'-6"	22'-2"	20'-8"	28'-0"	25'-7"	23'-8"	19'-9"
		16"	28'-6"	26'-0"	24'-7"	22'-10"	31'-1"	28'-1"	24'-9"	19'-9"
-	PWI-70	11-7/8"	23'-4"	21'-3"	20'-1"	18'-8"	25'-5"	23'-2"	21'-10"	18'-6"
		14"	26'-6"	24'-2"	22'-9"	21'-2"	28'-10"	26'-3"	23'-2"	18'-6"
		16"	29'-3"	26'-8"	25'-2"	23'-1"	31'-11"	27'-10"	23'-2"	18'-6"
-	PWI-93	11-7/8"	26'-4"	23'-11"	22'-6"	20'-11"	28'-8"	26'-0"	24'-6"	21'-10"
		14"	29'-10"	27'-2"	25'-7"	23'-9"	32'-6"	29'-6"	27'-10"	23'-11"
		16"	33'-0"	30'-0"	28'-3"	25'-5"	36'-0"	32'-8"	30'-0"	23'-11"
-	PWI-77	9-1/2"	19'-8"	17'-11"	16'-11"	15'-9"	21'-5"	19'-6"	18'-4"	17'-1"
		11-7/8"	23'-4"	21'-4"	20'-1"	18'-9"	25'-5"	23'-2"	21'-10"	20'-4"
		14"	26'-6"	24'-2"	22'-10"	21'-3"	28'-11"	26'-4"	24'-10"	22'-0"
		16"	29'-4"	26'-9"	25'-3"	23'-6"	32'-0"	29'-2"	27'-6"	22'-0"
-	PWI-90	9-1/2"	22'-2"	20'-2"	19'-0"	17'-8"	24'-1"	21'-11"	20'-7"	19'-2"
		11-7/8"	26'-4"	23'-11"	22'-7"	21'-0"	28'-8"	26'-1"	24'-6"	22'-9"
		14"	29'-10"	27'-2"	25'-7"	23'-9"	32'-7"	29'-7"	27'-10"	25'-10"
		16"	33'-0"	30'-1"	28'-4"	26'-4"	36'-0"	32'-9"	30'-10"	26'-7"

For **SI** : 1 inch = 25.4 mm

1. Allowable simple or continuous clear spans applicable to residential floor construction with a design dead load of 10 psf and live load of 40 psf. Live load deflection is limited to L/480, where L is the span. Use beam sizing software to analyze continuous span joists if the length of any span is less than 40% of the length of an adjacent span.
2. Spans are based on a composite floor with glued and nailed sheathing meeting the requirements for APA Rated Sheathing or APA Rated STURD-I-FLOOR conforming to PRP-108, PS 1, or PS 2 with a minimum thickness of 19/32 inch (40/20 or 20 oc) for a joist spacing of 19.2 inches or less, or 23/32 inch (48/24 or 24 oc) for a joist spacing of 24 inches. Adhesive shall meet APA Specification AFG-01 or ASTM D 3498. Spans shall be reduced 12 inches when the floor sheathing is nailed only.
3. The minimum bearing length shall be 1-3/4 inches at end supports and 3-1/2 inches at intermediate supports.
4. Web stiffeners are not required at supports when the joists are used with the spans and spacings given in this table, except as may be required by hanger manufacturers.
5. PRI-400 Performance Standard for APA EWS I-Joists
6. Pacific Woodtech Corporation

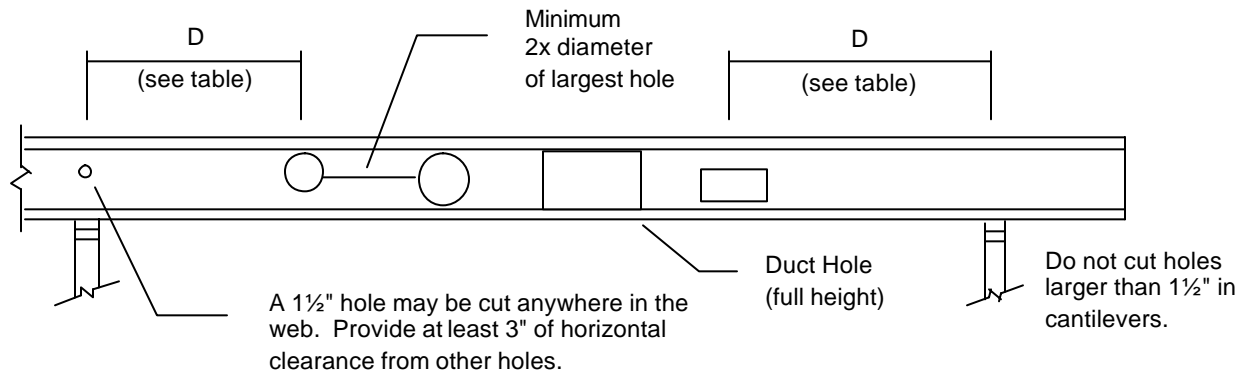


Table 4 – Duct Holes

Minimum Distance 'D' From Any Support to the Centerline of the Hole

Joist Series	Joist Span	Duct Hole Width				
		8"	10"	12"	14"	16"
20	8 ft.	3'-7"	3'-8"	3'-10"		
	12 ft.	5'-5"	5'-7"	5'-9"		
	16 ft.	7'-3"	7'-5"	7'-8"		
	20 ft.	9'-1"	9'-4"	9'-7"		
30	8 ft.	3'-9"	3'-10"	3'-11"		
	12 ft.	5'-8"	5'-9"	5'-11"		
	16 ft.	7'-6"	7'-8"	7'-11"		
	20 ft.	9'-5"	9'-8"	9'-10"		
40/60	8 ft.	3'-7"	3'-8"	3'-9"	3'-11"	
	12 ft.	5'-5"	5'-7"	5'-8"	5'-10"	
	16 ft.	7'-3"	7'-5"	7'-7"	7'-10"	
	20 ft.	9'-1"	9'-4"	9'-6"	9'-9"	
	24 ft.	10'-11"	11'-2"	11'-5"	11'-9"	
	28 ft.	12'-9"	13'-1"	13'-4"	13'-8"	
50	8 ft.	3'-8"	3'-9"	3'-10"	3'-11"	
	12 ft.	5'-6"	5'-7"	5'-9"	5'-11"	
	16 ft.	7'-4"	7'-6"	7'-9"	7'-11"	
	20 ft.	9'-2"	9'-5"	9'-8"	9'-11"	
	24 ft.	11'-0"	11'-3"	11'-7"	11'-11"	
	28 ft.	12'-10"	13'-2"	13'-7"	13'-11"	
70	12 ft.	5'-3"	5'-5"	5'-7"	5'-9"	5'-11"
	16 ft.	7'-1"	7'-3"	7'-5"	7'-8"	7'-10"
	20 ft.	8'-10"	9'-1"	9'-4"	9'-7"	9'-10"
	24 ft.	10'-7"	10'-11"	11'-2"	11'-6"	11'-10"
	28 ft.	12'-5"	12'-9"	13'-1"	13'-5"	13'-9"
	32 ft.	14'-2"	14'-7"	14'-11"	15'-4"	15'-9"
80/93	8 ft.	3'-7"	3'-8"	3'-9"	3'-10"	3'-11"
	12 ft.	5'-5"	5'-6"	5'-7"	5'-9"	5'-10"
	16 ft.	7'-2"	7'-4"	7'-6"	7'-8"	7'-10"
	20 ft.	9'-0"	9'-2"	9'-5"	9'-7"	9'-9"
	24 ft.	10'-10"	11'-0"	11'-3"	11'-6"	11'-9"
	28 ft.	12'-7"	12'-11"	13'-2"	13'-5"	13'-9"
77	12 ft.	5'-8"	5'-9"	5'-11"		
	16 ft.	7'-6"	7'-8"	7'-10"		
	20 ft.	9'-5"	9'-8"	9'-10"		
	24 ft.	11'-4"	11'-7"	11'-10"		
	28 ft.	13'-2"	13'-6"	13'-9"		
	32 ft.	15'-1"	15'-5"	15'-9"		
90 depth ≤ 20"	12 ft.	5'-7"	5'-8"	5'-10"	5'-11"	
	16 ft.	7'-6"	7'-7"	7'-9"	7'-11"	
	20 ft.	9'-4"	9'-6"	9'-8"	9'-10"	
	24 ft.	11'-3"	11'-5"	11'-8"	11'-10"	
	28 ft.	13'-1"	13'-4"	13'-7"	13'-10"	
	32 ft.	15'-0"	15'-3"	15'-6"	15'-10"	

Tables 4 & 5 Notes:

1. Table values apply to joists sized by means of Table 3 of this report
2. Web holes may be located anywhere between the joist flanges. Leave at least 1/8 inch clearance between the edges of holes and the flanges.
3. Do not cut holes in cantilevers.
4. The horizontal clearance between the edges of adjacent holes must be at least twice the diameter (or longest side) of the larger hole. Exception: A 1-1/2 inch diameter hole may be drilled anywhere in the web. Provide at least 3 inches of horizontal clearance from adjacent holes of any size.
5. 1-1/2 inch diameter holes are factory-scored in the web at 16 inches on center.

For Series 90 depths ≥ 22", refer to the engineered design recommendations in Section 2.2.3

For SI: 1 inch = 25.4 mm

Table 5 – Round and Rectangular Holes
 Minimum Distance 'D' From Any Support to the Centerline of the Hole – See Tables 4 & 5 Notes

Round Hole Diameter	2"	3"	4"	5"	6-1/4"	8-5/8"	10"	12-3/4"	14-3/4"	16-3/4"
Rectangular Hole Side	1-1/2"	2-1/4"	3"	3-3/4"	4-1/2"	6-1/4"	7-1/2"	8"	9-1/2"	11"
8 ft.	1'-0"	1'-6"	2'-1"	2'-7"	3'-3"					
12 ft.	1'-6"	2'-4"	3'-1"	3'-11"	4'-11"					
16 ft.	2'-1"	3'-1"	4'-2"	5'-3"	6'-6"					
8 ft.	1'-0"	1'-1"	1'-7"	2'-0"	2'-6"	3'-7"				
12 ft.	1'-0"	1'-8"	2'-4"	3'-0"	3'-10"	5'-4"				
16 ft.	1'-5"	2'-3"	3'-2"	4'-0"	5'-1"	7'-2"				
20 ft.	1'-9"	2'-10"	3'-11"	5'-0"	6'-4"	8'-11"				
12 ft.	1'-0"	1'-1"	1'-5"	2'-0"	2'-9"	4'-2"	5'-0"	5'-6"		
16 ft.	1'-0"	1'-1"	1'-10"	2'-8"	3'-8"	5'-7"	6'-9"	7'-4"		
20 ft.	1'-0"	1'-4"	2'-4"	3'-4"	4'-7"	7'-0"	8'-5"	9'-2"		
24 ft.	1'-0"	1'-7"	2'-10"	4'-0"	5'-7"	8'-5"	10'-1"	11'-0"		
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-6"	2'-11"	3'-9"	4'-3"	5'-0"	5'-6"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	2'-0"	3'-11"	5'-1"	5'-8"	6'-8"	7'-4"
20 ft.	1'-0"	1'-1"	1'-2"	1'-3"	2'-6"	4'-11"	6'-4"	7'-1"	8'-5"	9'-2"
24 ft.	1'-0"	1'-1"	1'-2"	1'-6"	3'-0"	5'-11"	7'-7"	8'-6"	10'-1"	11'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-9"	3'-7"	6'-11"	8'-11"	10'-0"	11'-9"	12'-10"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-7"	2'-5"	2'-11"	3'-8"	4'-2"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-1"	3'-3"	3'-10"	4'-11"	5'-5"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-7"	4'-1"	4'-10"	6'-2"	6'-11"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-11"	5'-10"	7'-5"	8'-4"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-8"	5'-8"	6'-10"	8'-8"	9'-9"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	1'-5"	1'-10"	2'-7"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	1'-9"	2'-5"	3'-5"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	2'-3"	3'-0"	4'-3"	5'-1"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	2'-8"	3'-8"	5'-2"	6'-1"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	3'-2"	4'-3"	6'-0"	7'-1"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-5"	3'-7"	4'-10"	6'-11"	8'-1"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-11"	2'-5"	2'-9"	3'-3"	3'-7"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-6"	3'-3"	3'-8"	4'-5"	4'-10"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-1"	4'-8"	6'-0"	7'-5"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-10"	4'-11"	5'-7"	7'-3"	8'-11"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	4'-5"	5'-9"	6'-6"	7'-9"	8'-6"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	5'-1"	6'-7"	7'-5"	8'-10"	9'-8"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-4"	1'-11"	2'-2"	2'-8"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-9"	2'-6"	2'-11"	3'-7"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-3"	3'-2"	3'-8"	4'-6"	5'-0"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-8"	3'-10"	4'-5"	5'-5"	6'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-5"	5'-2"	6'-4"	7'-0"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-7"	5'-1"	6'-4"	7'-3"	8'-0"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-3"	1'-11"	2'-2"	2'-8"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-9"	2'-6"	2'-11"	3'-7"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-3"	3'-2"	3'-8"	4'-6"	5'-0"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-8"	3'-10"	4'-5"	5'-5"	6'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-5"	5'-2"	6'-4"	7'-0"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-7"	5'-1"	6'-4"	7'-3"	8'-0"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-3"	1'-11"	2'-2"	2'-8"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-9"	2'-6"	2'-11"	3'-7"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-3"	3'-2"	3'-8"	4'-6"	5'-0"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-8"	3'-10"	4'-5"	5'-5"	6'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-5"	5'-2"	6'-4"	7'-0"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-7"	5'-1"	6'-4"	7'-3"	8'-0"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-3"	1'-11"	2'-2"	2'-8"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-9"	2'-6"	2'-11"	3'-7"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-3"	3'-2"	3'-8"	4'-6"	5'-0"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-8"	3'-10"	4'-5"	5'-5"	6'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-5"	5'-2"	6'-4"	7'-0"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-7"	5'-1"	6'-4"	7'-3"	8'-0"
12 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-3"	1'-11"	2'-2"	2'-8"	3'-0"
16 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	1'-9"	2'-6"	2'-11"	3'-7"	4'-0"
20 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-3"	3'-2"	3'-8"	4'-6"	5'-0"
24 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	2'-8"	3'-10"	4'-5"	5'-5"	6'-0"
28 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-2"	4'-5"	5'-2"	6'-4"	7'-0"
32 ft.	1'-0"	1'-1"	1'-2"	1'-2"	1'-3"	3'-7"	5'-1"	6'-4"	7'-3"	8'-0"