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DIVISION: 06—WOOD AND PLASTICS
Section: 06170—Prefabricated Structural Wood

REPORT HOLDER:

PACIFIC WOODTECH CORPORATION
POST OFFICE BOX 465
BURLINGTON, WASHINGTON 98233
(360) 707-2200
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EVALUATION SUBJECT:

PWI JOISTS

ADDITIONAL LISTEES:

CAPITAL LUMBER COMPANY
2111 EAST HIGHLAND AVENUE, SUITE 155
PHOENIX, ARIZONA 85016

* ~~CASCADE CAPITAL~~
~~230 EAST F STREET~~
~~TACOMA, WASHINGTON 98424~~

FRANKLIN BUILDING SUPPLY COMPANY
11700 FRANKLIN ROAD
BOISE, IDAHO 83709

GEORGIA-PACIFIC CORPORATION
4300 WILDWOOD PARKWAY
ATLANTA, GEORGIA 30339

1.0 EVALUATION SCOPE

Compliance with the following codes:

- * ■ ~~2003 International Building Code® (IBC)~~
- * ■ ~~2003 International Residential Code® (IRC)~~
- * ■ ~~BOCA® National Building Code/1999 (BNBC)~~
- * ■ ~~1999 Standard Building Code® (SBC)~~
- 1997 Uniform Building Code™ (UBC)

Properties evaluated:

Structural

2.0 USES

PWI joists are used as joists, rafters and headers.

3.0 DESCRIPTION

3.1 General:

Pacific Woodtech Corporation manufactures PWI I-joists and private label I-joists. The I-joists described in this report are

* prefabricated wood I-joists that comply with Section 2303, Item 5.1, of the UBC, ~~Section 2303.1.2 of the IBC~~, and ~~Section R502.1.4 of the IRC~~, for allowable stress design; ~~Section 2313.5 of the BNBC~~; and ~~Section 2301.4.11 of the SBC~~. The company names and associated product names for the PWI I-joists and private label I-joists are as follows:

COMPANY	PRODUCT NAME
Pacific Woodtech Corporation	PWI
Capital Lumber Company	Bulls-I
* Cascade Capital	CCI
Franklin Building Supply Company	FBI
Georgia-Pacific Corporation	GPI Wood I Beam®

UBC 23-3 ** The I-joists are manufactured to meet the performance standard recognized in ~~ICC-ES report ESR-1405~~ (PRI-400, ** Performance Standard for APA EWS I-joists), and/or the Pacific Woodtech Corporation I-Joist Quality Control Manual.

Descriptive details for the joists are noted in Table 1.

3.2 Materials:

3.2.1 Flanges: PWI joist flanges are Douglas fir laminated veneer lumber (LVL) or finger-jointed spruce-pine-fir machine stress rated (MSR) lumber that complies with the requirements of the approved quality control manual.

3.2.2 Webs: PWI joist webs are made from oriented strand board (OSB) structural-use panels that comply with the requirements of the approved quality control manual. Minimum 8-foot-long (2438 mm) web sections are assembled with glued tongue-and-groove joints to form a continuous web. The flange-web connection is made by gluing the web into a rout in the center of each flange.

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

4.0 DESIGN AND INSTALLATION

4.1 General:

Design and installation are governed by the applicable code, standards referenced by the applicable code, and the manufacturer's installation instructions.

4.2 Allowable Capacity:

Allowable design properties are provided in Table 2.

4.3 Web Stiffeners:

Web stiffeners are not required, with the following exceptions:

- a. 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.
- b. Web stiffeners are required to accommodate special hanger nailing requirements. Refer to the hanger installation instructions.

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* deleted by City of Los Angeles
** revised by City of Los Angeles

- c. Web stiffeners are required under concentrated loads applied to the top of the I-joint between supports, or along cantilevers beyond the support, when the concentrated load exceeds 1500 pounds (6672 N).
- d. Web stiffeners are required at birdsmouth cuts at the low end support of sloped joists.
- e. 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.

4.4 Lateral Support:

The compression flange requires continuous lateral support. Joist ends require restraint to prevent rollover. Methods specified in the applicable code for lateral support of sawn lumber are acceptable. Bridging is not required in the joist span.

4.5 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 the notes in Tables 4 and 5 and use the following allowable hole shear values:

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

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):

PWI 20/30 $V_{hole} = 300 - 8.5 \times \text{width}$

PWI 50 $V_{hole} = 360 - 11 \times \text{width}$

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

PWI 90/93 $V_{hole} = 515 - 12 \times \text{width}$

where:

V_{hole} = allowable joist shear at web hole (lbs).

Width = duct hole width (inches).

4.6 Duration of Load:

Adjustments for duration of load, in accordance with Part 2.3.2 of the NDS or Item 6 of Section 2316.2 of the UBC, apply to joists covered by this report and their fasteners.

4.7 Repetitive Member Use:

The repetitive-member use factors applicable to the resistive moment capacities listed in Table 2 of this report are limited to 1.0.

4.8 Fasteners:

Allowable capacities and spacing for nails into the flanges of PWI-40 and PWI-60 joists with MSR lumber flanges are in accordance with the NDS for solid-sawn lumber with specific gravities, respectively, of 0.42 and 0.46. Allowable capacities and spacing for nails into the top of flanges of PWI joists with LVL flanges are in accordance with the NDS for solid-sawn lumber with a specific gravity of 0.50. Allowable capacities and spacing for nails into the side of flanges of PWI joists with LVL flanges are in accordance with the NDS for solid-sawn lumber with a specific gravity of 0.49.

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

~~4.9.1 Assembly 1: The I-joists described in this report, with minimum flange size of 1¹/₂ inches (38 mm) by 2¹/₂ inches (64 mm), can be used with the assembly described in Figure 3 of ESR-1405.~~ *

4.9.2 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 720.1(3), Item 22-1.1, of the IBC. Minimum 9¹/₄-inch-deep (235 mm) wood I-joists shall be spaced a maximum of 24 inches (610 mm) on center. Minimum flange size is 1⁵/₁₆ inches thick by 1¹/₂ inches wide (33 by 38 mm). Minimum web thickness is 3/₈ inch (10 mm).

~~4.9.3 Assembly 3: The I-joists described in this report can be used with the assembly details described in Section 4.2.2.4 of ESR-1405.~~ *

4.9.4 Assembly 4:

4.9.4.1 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 3/₈-inch-thick (10 mm) panel-type underlayment; or ceramic tile on 1¹/₄-inch (32 mm) mortar bed.

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

4.9.4.3 Wood Structural Members: Minimum 9¹/₂ -inch-deep (241 mm) wood I-joists spaced a maximum of 24 inches (610 mm) on center. Minimum flange size is 1¹/₂ inches thick by 1¹/₂ inches wide (38 by 38 mm). Minimum web thickness is 3/₈ inch (10 mm).

4.9.4.4 Insulation (Optional): 3¹/₂-inch (89 mm) glass fiber batts, or 3¹/₂-inch (89 mm) mineral wool batts.

4.9.4.5 Resilient Channels: Minimum 0.018-inch-thick (0.5 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. The channels are attached to the bottom of each joist with a 1¹/₄-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. The additional channel may be extended 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.

4.9.4.6 Ceiling: Two layers of 1/2-inch-thick (13 mm), Type X gypsum board in compliance with ASTM C 36. The long edge of each layer shall be perpendicular to the channels (parallel to the joists). End and side joints shall be staggered at least 16 inches (406 mm) from layer to layer. The first layer shall be fastened to the resilient channels with 1¹/₄-inch (32 mm), Type S screws at 12 inches (305 mm) on center. Screws shall be installed a minimum of 3/₈ inch (10 mm) from end joints and a minimum of 1¹/₂ inches (38 mm) from side joints. The second layer shall be fastened to the resilient channels with 5/₈-inch (41 mm), Type S screws at 12 inches (305 mm) on center. Screws shall be installed a minimum of 1/2 inch (13 mm) from end and side joints. One-and-one-half-inch (38 mm), Type G screws may be substituted at end joints in the second layer when end joints fall between channels.

4.10 Other:

Installation and construction details not specifically covered herein shall be in accordance with evaluation report ESR-1405.

5.0 CONDITIONS OF USE

The Pacific Woodtech Corporation private label I-joists described in this report comply with, or are suitable

alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 I-joists are manufactured at the Pacific Woodtech facility in Burlington, Washington, with quality control inspections by APA-EWS.
- 5.2 For applications based on Table 2, design calculations and details for specific applications shall be furnished to the code official, when requested, when the permit is applied for. Calculations and drawings shall be prepared, signed and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.3 I-joists are permitted in dry-use service conditions only.
- 5.4 Cutting of flanges is not permitted.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Prefabricated Wood I-joists (AC14), dated June 2004.
- 6.2 A quality control manual.

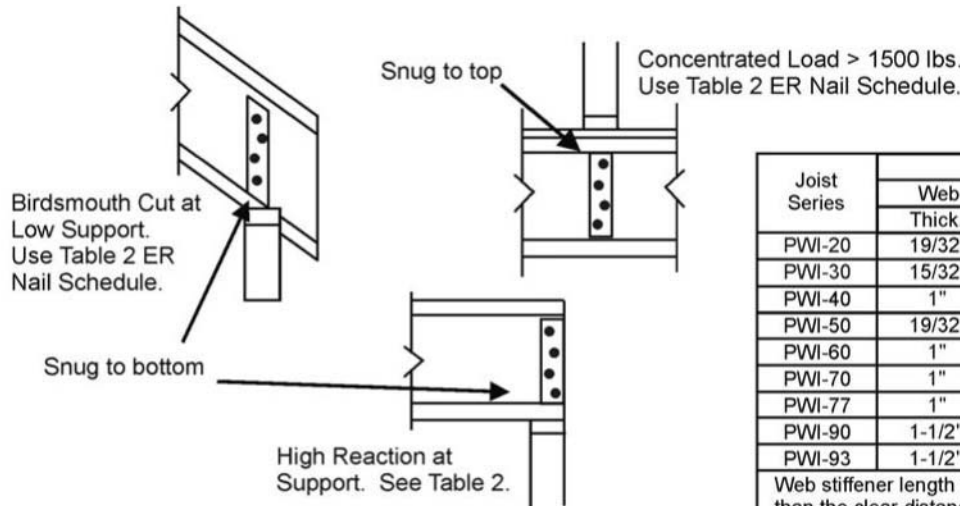
7.0 IDENTIFICATION

Each I-joist shall be marked with the product trade name or trademark; the joist series; the production date; the evaluation report number (ESR-1225); the name or trademark of the inspection agency (APA-EWS); the name of the manufacturer (Pacific Woodtech) or the name of one of the additional listees noted in this report; and the manufacturer's APA mill number (1048).

TABLE 1—PWI JOISTS

JOIST SERIES	I-JOIST DEPTH (inches)	FLANGE			WEB MATERIAL
		Material	Width (inches)	Depth (inches)	
PWI-20	9 ¹ / ₂ thru 11 ⁷ / ₈	LVL	1 ³ / ₄	1 ³ / ₈	³ / ₈ inch thick OSB
PWI-30	9 ¹ / ₂ thru 11 ⁷ / ₈	LVL	1 ¹ / ₂	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-40	9 ¹ / ₄ thru 16	LVL	2 ⁵ / ₁₆	1 ³ / ₈	³ / ₈ inch thick OSB
PWI-40	9 ¹ / ₂ thru 16	MSR	2 ¹ / ₂	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-50	9 ¹ / ₂ thru 16	LVL	1 ³ / ₄	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-60	9 ¹ / ₄ thru 16	LVL	2 ⁵ / ₁₆	1 ³ / ₈	³ / ₈ inch thick OSB
PWI-60	9 ¹ / ₂ thru 16	MSR	2 ¹ / ₂	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-70	11 ⁷ / ₈ thru 20	LVL	2 ⁵ / ₁₆	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-93	11 ⁷ / ₈ thru 16	LVL	3 ¹ / ₂	1 ¹ / ₂	³ / ₈ inch thick OSB
PWI-77	9 ¹ / ₂ thru 20	LVL	2 ⁵ / ₁₆	1 ¹ / ₂	⁷ / ₁₆ inch thick OSB
PWI-90	9 ¹ / ₂ thru 24	LVL	3 ¹ / ₂	1 ¹ / ₂	⁷ / ₁₆ inch thick OSB

For SI: 1 inch = 25.4 mm.



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

Web stiffener length is approximately 1/8" less than the clear distance between flanges.

FIGURE 1—WEB STIFFENERS

TABLE 2—DESIGN PROPERTIES¹

JOIST SERIES	JOIST DEPTH (in.)	EI ² (x 10 ⁶ lb-in ²)	k ³ (x 10 ⁶ lbs)	M ⁴ (ft-lbs)	V ⁵ (lbs)	ER ⁶ (lbs)					IR ⁷ (lbs)				
						1 ³ / ₄ inches		3 ¹ / ₂ inches		WS ⁸ Nails	3 ¹ / ₂ inches		5 ¹ / ₄ inches		WS ⁸ Nails
						No WS	WS	No WS	WS		No WS	WS	No WS	WS	
PWI-20	9 ¹ / ₂ ⁹	145	4.94	2520	1120	830	N.A.	1056	N.A.	4	1700	N.A.	N.A.	N.A.	4
	11 ⁷ / ₈ ⁹	253	6.18	3265	1420	830	N.A.	1289	N.A.	4	1700	N.A.	N.A.	N.A.	4
PWI-30	9 ¹ / ₂ ⁹	161	4.94	3225	1120	945	N.A.	1081	N.A.	4	1905	N.A.	N.A.	N.A.	4
	11 ⁷ / ₈ ⁹	280	6.18	4170	1420	945	N.A.	1314	N.A.	4	1905	N.A.	N.A.	N.A.	4
PWI-40	9 ¹ / ₄	181	4.80	2650	1080	1080	N.A.	1080	N.A.	4	2160	N.A.	N.A.	N.A.	4
	9 ¹ / ₂ ⁹	193	4.94	2735	1120	1080	N.A.	1111	N.A.	4	2160	N.A.	N.A.	N.A.	4
	11 ⁷ / ₈ ⁹	330	6.18	3545	1420	1200	N.A.	1371	N.A.	4	2500	N.A.	N.A.	N.A.	4
	14 ⁹	482	7.28	4270	1710	1200	N.A.	1472	1597	4	2500	N.A.	N.A.	N.A.	4
	16 ⁹	657	8.32	4950	1970	1200	N.A.	1472	1799	4	2500	N.A.	N.A.	N.A.	4
PWI-50	9 ¹ / ₂ ⁹	186	4.94	3800	1120	1015	N.A.	1097	N.A.	4	2040	N.A.	N.A.	N.A.	4
	11 ⁷ / ₈ ⁹	322	6.18	4915	1420	1015	N.A.	1330	N.A.	4	2040	N.A.	N.A.	N.A.	4
	14 ⁹	480	7.28	5860	1710	1015	N.A.	1303	1389	4	2040	N.A.	N.A.	N.A.	4
	16 ⁹	663	8.32	6715	1970	1015	N.A.	1303	1529	4	2040	N.A.	N.A.	N.A.	4
PWI-60	9 ¹ / ₄	218	4.80	3665	1080	1080	N.A.	1080	N.A.	4	2160	N.A.	N.A.	N.A.	4
	9 ¹ / ₂ ⁹	231	4.94	3780	1120	1080	N.A.	1111	N.A.	4	2160	N.A.	N.A.	N.A.	4
	11 ⁷ / ₈ ⁹	396	6.18	4900	1420	1200	N.A.	1371	N.A.	4	2500	N.A.	N.A.	N.A.	4
	14 ⁹	584	7.28	5895	1710	1200	N.A.	1472	1597	4	2500	N.A.	N.A.	N.A.	4
	16 ⁹	799	8.32	6835	1970	1200	N.A.	1472	1799	4	2500	N.A.	N.A.	N.A.	4
PWI-70	11 ⁷ / ₈ ¹⁰	440	6.19	6730	1420	1160	1420	1420	N.A.	4	2335	2767	2840	N.A.	4
	14 ¹⁰	644	7.33	8030	1710	1160	1592	1615	1710	4	2335	2767	2870	3302	4
	16 ¹⁰	873	8.42	9200	1970	1160	1592	1615	1970	4	2335	2767	2870	3302	4
	18	1141	9.53	10,355	2239	1160	1808	1615	2239	6	2335	3199	2870	3734	8
	20	1447	10.63	11,495	2506	1160	1808	1615	2263	6	2335	3199	2870	3734	8
PWI-93	11 ⁷ / ₈	659	6.18	10,315	1420	1280	N.A.	1389	N.A.	4	2760	N.A.	N.A.	N.A.	4
	14	961	7.28	12,305	1710	1280	N.A.	1490	1614	4	3020	N.A.	N.A.	N.A.	4
	16	1301	8.32	14,095	1970	1280	N.A.	1490	1817	4	3020	N.A.	N.A.	N.A.	4
PWI-77	9 ¹ / ₂	261	5.57	5155	1675	1390	1675	1675	N.A.	4	2780	N.A.	3350	N.A.	4
	11 ⁷ / ₈	442	6.92	6675	1925	1390	1890	1885	1925	4	2780	3280	3395	3850	4
	14	648	8.17	7960	2125	1390	1890	1885	2125	4	2780	3280	3395	3895	4
	16	881	9.35	9120	2330	1390	1890	1885	2330	4	2780	3280	3395	3895	4
	18	1152	10.55	10,265	2535	1390	2140	1885	2535	6	2780	3780	3395	4395	8
	20	1463	11.76	11,395	2740	1390	2140	1885	2635	6	2780	3780	3395	4395	8
PWI-90	9 ¹ / ₂	392	5.57	7915	1675	1400	1675	1675	N.A.	4	3350	N.A.	3350	N.A.	4
	11 ⁷ / ₈ ¹⁰	661	6.92	10,255	1925	1400	1900	1900	1925	4	3355	3850	3850	N.A.	4
	14 ¹⁰	965	8.17	12,235	2125	1400	1900	1900	2125	4	3355	3855	3970	4250	4
	16 ¹⁰	1306	9.35	14,020	2330	1400	1900	1900	2330	4	3355	3855	3970	4470	4
	18	1703	10.55	15,780	2535	1400	2150	1900	2535	6	3355	4355	3970	4970	8
	20	2155	11.76	17,520	2740	1400	2150	1900	2650	6	3355	4355	3970	4970	8
	22	2664	12.97	19,245	2935	N.A.	2400	N.A.	2900	8	N.A.	4605	N.A.	5220	10
24	3232	14.18	20,955	3060	N.A.	2400	N.A.	2900	8	N.A.	4605	N.A.	5220	10	

For SI: 1 inch = 25.4 mm, 1 lb = 4.448 N, 1 ft-lb = 1.35 N-m, 1 lb-in² = 179 N-mm².

¹The tabulated values are design values for normal duration of load. All values, except for EI and k, may be adjusted for other load duration as permitted by the applicable code.

²Bending stiffness (EI) of the I-joist.

³Coefficient of shear deflection (k). For calculating uniform load and center point load deflections of an I-joist in a simple-span application, use Equations 1 and 2.

Simple span uniformly distributed load:
$$\delta = \frac{5wl^4}{384EI} + \frac{wl^2}{k} \tag{1}$$

Simple span concentrated load at center of span:
$$\delta = \frac{Pl^3}{48EI} + \frac{2Pl}{k} \tag{2}$$

TABLE 2—DESIGN PROPERTIES¹ (Continued)

where:

- δ = Deflection (inches)
- EI = Stiffness (moment of inertia times modulus of elasticity) (lb-in²)
- k = Shear deflection coefficient (lbs)
- l = Effective span (inches)
- P = Concentrated load (lb)
- w = Uniform load (pounds per lineal inch)

⁴Moment capacity (M) shall not be increased by any code allowed repetitive member use factor.

⁵Shear capacity (V) of the I-joist.

⁶End reaction capacity (ER) of the I-joist, for 1¹/₂" and 3¹/₂" bearing lengths, with web stiffeners (WS) and without web stiffeners (No WS).

⁷Intermediate reaction capacity (IR) of the I-joist, for 3¹/₂" and 5¹/₄" bearing lengths, with web stiffeners (WS) and without web stiffeners (No WS).

⁸Refer to Figure 1 for minimum nail dimensions.

⁹Design properties meet the requirements of the *PRI-400 Performance Standard for APA EWS I-Joists* for the corresponding joist series and depth.

¹⁰Design properties exceed the requirements of the *PRI-400 Performance Standard for APA EWS I-Joists* for the corresponding joist series and depth.

TABLE 3—ALLOWABLE RESIDENTIAL FLOOR JOIST SPANS^{1,2,3,4}

JOIST SERIES	JOIST DEPTH	SIMPLE SPAN				CONTINUOUS SPAN (two or more spans)			
		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.
PWI-20	9 ¹ / ₂	16' - 7"	15' - 2"	14' - 4"	13' - 5"	18' - 1"	16' - 6"	15' - 7"	13' - 5"
	11 ⁷ / ₈	19' - 10"	18' - 2"	17' - 2"	16' - 0"	21' - 8"	19' - 7"	16' - 9"	13' - 5"
PWI-30	9 ¹ / ₂	17' - 1"	15' - 8"	14' - 9"	13' - 10"	18' - 7"	17' - 0"	16' - 1"	15' - 0"
	11 ⁷ / ₈	20' - 5"	18' - 8"	17' - 8"	16' - 6"	22' - 3"	20' - 4"	18' - 10"	15' - 0"
PWI-40	9 ¹ / ₄	17' - 7"	16' - 1"	15' - 2"	14' - 2"	19' - 2"	17' - 6"	16' - 1"	14' - 4"
	9 ¹ / ₂	18' - 0"	16' - 5"	15' - 6"	14' - 6"	19' - 7"	17' - 11"	16' - 4"	14' - 7"
	11 ⁷ / ₈	21' - 5"	19' - 7"	18' - 6"	16' - 8"	23' - 4"	20' - 5"	18' - 7"	16' - 7"
	14	24' - 4"	22' - 2"	20' - 6"	18' - 4"	25' - 11"	22' - 5"	20' - 5"	18' - 3"
	16	26' - 11"	24' - 3"	22' - 1"	19' - 9"	27' - 11"	24' - 2"	22' - 0"	19' - 8"
PWI-50	9 ¹ / ₂	17' - 10"	16' - 3"	15' - 4"	14' - 4"	19' - 5"	17' - 8"	16' - 8"	15' - 7"
	11 ⁷ / ₈	21' - 4"	19' - 6"	18' - 4"	17' - 2"	23' - 2"	21' - 2"	20' - 0"	16' - 1"
	14	24' - 3"	22' - 2"	20' - 11"	19' - 6"	26' - 6"	24' - 2"	20' - 2"	16' - 1"
	16	27' - 0"	24' - 8"	23' - 3"	20' - 2"	29' - 5"	24' - 3"	20' - 2"	16' - 1"
PWI-60	9 ¹ / ₄	18' - 7"	17' - 0"	16' - 0"	14' - 11"	20' - 3"	18' - 5"	17' - 5"	16' - 2"
	9 ¹ / ₂	18' - 11"	17' - 4"	16' - 4"	15' - 3"	20' - 8"	18' - 10"	17' - 9"	16' - 6"
	11 ⁷ / ₈	22' - 7"	20' - 8"	19' - 6"	18' - 2"	24' - 8"	22' - 6"	21' - 2"	19' - 7"
	14	25' - 9"	23' - 5"	22' - 2"	20' - 7"	28' - 0"	25' - 7"	24' - 1"	19' - 9"
	16	28' - 6"	26' - 0"	24' - 6"	22' - 10"	31' - 1"	28' - 4"	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.

¹Allowable clear spans with 10 psf dead load and 40 psf live load. Live load deflection is limited to L/480, where L is the span.

²Spans are based on a composite floor with glued and nailed sheathing meeting the requirements for APA Rated Sheathing or APA Rated STRUD-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.

³The minimum bearing length shall be 1³/₄ inches at end supports and 3¹/₂ inches at intermediate supports.

⁴Web 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 joist hanger manufacturers.

TABLE 4—DUCT HOLES^{1,2,3,4}

JOIST SERIES	JOIST SPAN	MINIMUM DISTANCE 'D' FROM ANY SUPPORT TO THE CENTERLINE OF THE HOLE				
		Duct Hole Width				
		8"	10"	12"	14"	16"
PWI-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"	----	----
PWI-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"	----	----
PWI-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"	----
PWI-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' - 4"	13' - 11"	----
PWI-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"
PWI-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"
PWI-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"	----	----
PWI-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"	----

For SI: 1 inch = 25.4 mm.

Footnotes to Table 4 are the same as in Table 5.

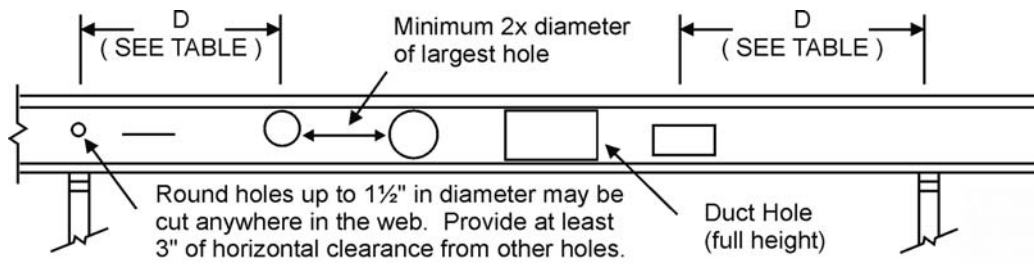


FIGURE 2—HOLES

TABLE 5— ROUND AND RECTANGULAR HOLES^{1,2,3,4}

MINIMUM DISTANCE 'D' FROM ANY SUPPORT TO THE CENTERLINE OF THE HOLE															
Round Hole Diameter	2"	3"	4"	5"	6"	6 ¹ / ₄ "	8 ⁵ / ₈ "	10"	10 ³ / ₄ "	12"	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 "	4 ¹ / ₂ "	6 ¹ / ₄ "	7 ¹ / ₂ "	8"	9"	9 ¹ / ₂ "	11"	12 ¹ / ₂ "		
9 ¹ / ₄ " Joist	Span	8 ft.	1' - 0"	1' - 7"	2' - 1"	2' - 8"	3' - 2"	----	----	----	----	----	----	----	
		12 ft.	1' - 7"	2' - 5"	3' - 2"	4' - 0"	4' - 10"	----	----	----	----	----	----	----	----
		16 ft.	2' - 1"	3' - 2"	4' - 3"	5' - 4"	6' - 5"	----	----	----	----	----	----	----	----
9 ¹ / ₂ " Joist	Span	8 ft.	1' - 0"	1' - 6"	2' - 1"	2' - 7"	3' - 1"	3' - 3"	----	----	----	----	----	----	
		12 ft.	1' - 6"	2' - 4"	3' - 1"	3' - 11"	4' - 8"	4' - 11"	----	----	----	----	----	----	----
		16 ft.	2' - 1"	3' - 1"	4' - 2"	5' - 3"	6' - 3"	6' - 6"	----	----	----	----	----	----	----
11 ⁷ / ₈ " Joist	Span	8 ft.	1' - 0"	1' - 1"	1' - 7"	2' - 0"	2' - 5"	2' - 6"	3' - 7"	----	----	----	----	----	
		12 ft.	1' - 0"	1' - 8"	2' - 4"	3' - 0"	3' - 8"	3' - 10"	5' - 4"	----	----	----	----	----	
		16 ft.	1' - 5"	2' - 3"	3' - 2"	4' - 0"	4' - 10"	5' - 1"	7' - 2"	----	----	----	----	----	
		20 ft.	1' - 9"	2' - 10"	3' - 11"	5' - 0"	6' - 1"	6' - 4"	8' - 11"	----	----	----	----	----	
14" Joist	Span	12 ft.	1' - 0"	1' - 1"	1' - 5"	2' - 0"	2' - 7"	2' - 9"	4' - 2"	5' - 0"	5' - 6"	----	----	----	
		16 ft.	1' - 0"	1' - 1"	1' - 10"	2' - 8"	3' - 6"	3' - 8"	5' - 7"	6' - 9"	7' - 4"	----	----	----	
		20 ft.	1' - 0"	1' - 4"	2' - 4"	3' - 4"	4' - 4"	4' - 7"	7' - 0"	8' - 5"	9' - 2"	----	----	----	
		24 ft.	1' - 0"	1' - 7"	2' - 10"	4' - 0"	5' - 3"	5' - 7"	8' - 5"	10' - 1"	11' - 0"	----	----	----	
16" Joist	Span	12 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 4"	1' - 6"	2' - 11"	3' - 9"	4' - 3"	5' - 0"	5' - 6"	----	
		16 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 10"	2' - 0"	3' - 11"	5' - 1"	5' - 8"	6' - 8"	7' - 4"	----	
		20 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 3"	2' - 3"	2' - 6"	4' - 11"	6' - 4"	7' - 1"	8' - 5"	9' - 2"	----	
		24 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 6"	2' - 9"	3' - 0"	5' - 11"	7' - 7"	8' - 6"	10' - 1"	11' - 0"	----	
		28 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 9"	3' - 2"	3' - 7"	6' - 11"	8' - 11"	10' - 0"	11' - 9"	12' - 10"	----	
18" Joist	Span	12 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 7"	2' - 5"	2' - 11"	3' - 8"	4' - 2"	5' - 5"	
		16 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	2' - 1"	3' - 3"	3' - 10"	4' - 11"	5' - 7"	7' - 3"	
		20 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	2' - 7"	4' - 1"	4' - 10"	6' - 2"	6' - 11"	9' - 1"	
		24 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	3' - 2"	4' - 11"	5' - 10"	7' - 5"	8' - 4"	10' - 10"	
		28 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	3' - 8"	5' - 8"	6' - 10"	8' - 8"	9' - 9"	12' - 8"	
20" Joist	Span	16 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 4"	1' - 9"	2' - 5"	3' - 5"	4' - 0"	5' - 8"	
		20 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 4"	2' - 3"	3' - 0"	4' - 3"	5' - 1"	7' - 1"	
		24 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 4"	2' - 8"	3' - 8"	5' - 2"	6' - 1"	8' - 6"	
		28 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 4"	3' - 2"	4' - 3"	6' - 0"	7' - 1"	9' - 11"	
		32 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 5"	3' - 7"	4' - 10"	6' - 11"	8' - 1"	11' - 5"	
22" Joist	Span	16 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	2' - 6"	3' - 3"	3' - 8"	4' - 5"	4' - 10"	5' - 11"	
		20 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 4"	1' - 6"	3' - 2"	4' - 1"	4' - 8"	5' - 6"	6' - 0"	7' - 5"	
		24 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 7"	1' - 10"	3' - 10"	4' - 11"	5' - 7"	6' - 7"	7' - 3"	8' - 11"	
		28 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 11"	2' - 2"	4' - 5"	5' - 9"	6' - 6"	7' - 9"	8' - 6"	10' - 5"	
		32 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	2' - 2"	2' - 5"	5' - 1"	6' - 7"	7' - 5"	8' - 10"	9' - 8"	11' - 11"	
24" Joist	Span	16 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	1' - 9"	2' - 6"	2' - 11"	3' - 7"	4' - 0"	5' - 1"	
		20 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	2' - 3"	3' - 2"	3' - 8"	4' - 6"	5' - 0"	6' - 4"	
		24 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	2' - 8"	3' - 10"	4' - 5"	5' - 5"	6' - 0"	7' - 7"	
		28 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	3' - 2"	4' - 5"	5' - 2"	6' - 4"	7' - 0"	8' - 10"	
		32 ft.	1' - 0"	1' - 1"	1' - 2"	1' - 2"	1' - 3"	1' - 3"	3' - 7"	5' - 1"	5' - 11"	7' - 3"	8' - 0"	10' - 2"	

For SI: 1 inch = 25.4 mm.

¹Table values apply to joists sized by means of Table 3.

²Web holes may be located anywhere between the joist flanges. Leave at least 1/8 inch clearance between the edges of holes and the flanges.

³Holes larger than 1 1/2 inches in diameter shall not be cut in cantilevers.

⁴The horizontal clearance between the edges of adjacent holes shall 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 provided at least 3 inches of horizontal clearance from adjacent holes of any size is provided.