



ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

Legacy report on the 2000 International Building Code®, 2000 International Residential Code®, 2002 Accumulative Supplement to the International Codes™, BOCA® National Building Code/1999, the 1999 Standard Building Code®, the 1997 Uniform Building Code™ and the 1998 International One and Two Family Dwelling Code®

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

STARK TRUSS COMPANY, INC.
8655 CHESTNUT RIDGE RD. NW
BEACH CITY, OH 44608

1.0 SUBJECT

- 1.1 SI 40 / PRI 40 Series I-Joist
1.2 SI 60 / PRI 60 Series I-Joist
1.3 SI 80 / PRI 80 Series I-Joist

2.0 PROPERTY FOR WHICH EVALUATION IS SOUGHT

- 2.1 Structural
2.2 Fire Assembly

3.0 DESCRIPTION

3.1 General

SI Prefabricated Wood I-Joists consist of solid sawn lumber flanges and oriented strand board (OSB) webs. The top and bottom flanges are grooved to allow the web to be inserted a depth of 0.5 inches (12.7 mm) into the flanges. The web sections are installed with the face grain perpendicular to the long axis of the I-joist, and are fabricated in depths of 9 1/4 inches, 9 1/2 inches, 11 1/4 inches, 11 7/8 inches, 14 inches and 16 inches.

3.2. Materials

3.2.1 Flange stock for SI 40 / PRI 40 Series I-Joist is Machine Stress Rated (MSR) lumber either Spruce-Pine-Fir. Flange material is 2 by 3 MSR lumber rated at 1650f-1.5E, with finished flange dimensions of 1 1/2 by 2 1/2 inches (38 mm by 63.5 mm). See Table 2.

3.2.2 Flange stock for SI 60 / PRI 60 Series I-Joist is Machine Stress Rated (MSR) lumber either Spruce-Pine-Fir. Flange material is 2 by 3 MSR lumber rated at 2100f-1.8E, with finished flange dimensions of 1 1/2 by 2 1/2 inches (38 mm by 63.5 mm). See Table 2.

3.2.3 Flange stock for SI 80 / PRI 80 Series I-Joist is Machine Stress Rated (MSR) lumber either Spruce-Pine-Fir. Flange material is 2 by 4 MSR lumber rated at 2100f-1.8E, with finished flange dimensions of 1 1/2 by 3 1/2 inches (38 mm by 89 mm). See Table 2.

3.2.4 Web material is 3/8 inch (9.5 mm) oriented strand board (OSB) Exposure 1 and APA trademark.

3.2.5 Adhesives used in the I-joist manufacturing process conform to the requirements of ASTM D 2559 and the Stark Truss Quality Control Manual.

3.3 Design

Design properties are determined analytically in accordance with ASTM D 5055. Allowable design values, allowable loads and spans are given in the Tables at the end of this report. Maximum allowable capacity is based on a minimum 4 inch (101.6 mm) bearing.

Allowable design values for SI I-Joist are as indicated in Table 1 of this report. Allowable design values for PRI I-Joist are as indicated in APA's PRI-400 Performance Standard for APA EWS I-Joists, dated March 2002. Available joist dimensions are as indicated in Table 2 of this report. Joists contain pre-fabricated 1 1/2 inches (38 mm) diameter knockouts, 16 inches (406 mm) on center, located 2 inches (51 mm) above the lower flange. Round holes are permitted in the webs of the joists in accordance with Table 5 of this report. Allowable floor spans for SI I-Joist are as indicated in Tables 3 and 4 of this report. Allowable floor spans for PRI I-Joist are as indicated in APA's PRI-400 Performance Standard for APA EWS I-Joists, dated March 2002. Web stiffeners are not required when I-joist are used in accordance with the spans and spacings given in Tables 3 and 4 of this report and APA PRI-400. Minimum bearing length for simple spans of joists shall be 1 3/4 inches (44 mm). Minimum bearing length at intermediate support points for multiple-span joists shall be 3 1/2 inches (89 mm). When joists are used as simple-span members, the design shear shall be equal to the end reaction.

Table 1 includes a provision for a 7 percent repetitive member increase of the allowable moment that is applicable for joists either in contact or spaced not more than 24 inches (610 mm) on center, not less than three in number, and joined by an approved load distributing element adequate to support the design load, such as approved wood structural panels.

Adjustments for duration of load provided for wood members and their connections shall be in accordance with the applicable code.

SI / PRI I-Joist properties and allowable loads in this report shall be limited to covered installations with dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber in which the moisture content is less than 16 percent.

Deflection of the joists under design load based on deflection due to bending and shear stresses related to strength of material principles shall be calculated using the following formulas:

ICC-ES legacy reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



For simple span with concentrated load at mid-span:

$$D = PL^3/48EI + 2PL/K$$

For simple span with uniformly distributed load:

$$D = 5WL^4/384EI + WL^2/K$$

where:

D = Deflection (inches)

W = uniform load (lbf/in)

L = Clear span (inches)

K = Shear deflection coefficient from Table 1 of this report (lbf)

EI = Value from Table 1 of this report (lbf-in²)

P = Concentrated load (lbf)

4.0 INSTALLATION

4.1 General

The manufacturer's published installation instructions, engineering drawings for each job, and this report shall be strictly adhered to and a copy of the instructions, drawings, and this report shall be available at all times on the job site during installation.

The instructions within this report govern if there are any conflicts between the manufacturer's published installation instructions and this report.

4.2 Structural

SI / PRI Series I-Joists shall be protected from the weather prior to installation in the structure. The joists shall not be used in places where they will be permanently exposed to weather or will obtain a moisture content greater than 16%.

4.3 Fire Assembly

PRI Series I-joists meet the requirements for fire assemblies as described in APA's ICC-ES report number ESR-1405.

5.0 IDENTIFICATION

Each SI / PRI Series I-joist products described in this report shall be identified by a stamp bearing the manufacturer's name and / or trademark, the model number, the name or logo of the third party inspection agency (APA) and this ICC-ES legacy report number.

6.0 EVIDENCE SUBMITTED

6.1 Manufacturer's descriptive literature, published installation instructions, specifications, architectural details.

6.2 Test report for SI / PRI Series I-Joists under ASTM D 5055, prepared by APA, dated April 3, 2000, Report No. T2000P-10, signed by Borjen Yeh, Ph.D., P.E. and William A Baker, P.E.. The following tests were performed:

- Flange tensile under Section 6.3.1.3 and 6.3.1.4
- Web flexural under Section 6.5.2.1
- Shear under Section 6.2
- Moment under Section 6.3.1 and 6.3.2
- Stiffness and creep under Section 6.5
- Web openings under Section 6.6.3
- End and intermediate reaction under Section 6.6.2

6.3 Quality Control Manual for Stark Truss Company, Inc. Wood I-Joists in Beach City, Ohio, dated January, 2004.

6.4 Test report for SI / PRI Series I-Joists under ASTM D 5055, prepared by APA, dated October 24, 2002, Report No. T2000P-52, signed by Borjen Yeh, Ph.D., P.E. and Zahaozhen Bao, Ph.D.. The following tests were performed:

- Shear under Section 6.2
- Moment under Section 6.3.1 and 6.3.2
- Stiffness and creep under Section 6.5
- Duct Chase / Web openings under Section 6.6.3
- End and intermediate reaction under Section 6.6.2

6.5 ICC-ES report number ESR-1405, which covers APA's PRI-400 Performance Standard for APA EWS I-Joists.

7.0 CONDITIONS OF USE

The ICC-ES Subcommittee for the National Evaluation Service finds that Stark Truss SI/ PRI Series I- Joists as described in this report conform with or is a suitable alternate to that specified in the 2000 *International Building Code*[®], 2000 *International Residential Code*[®], 2002 *Accumulative Supplement to the International Codes*[™], BOCA[®] *National Building Code/1999*, the 1999 *Standard Building Code*[®], the 1997 *Uniform Building Code*[™], and the 1998 *International One and Two Family Dwelling Code*[®], subject to the following conditions:

7.1 This Evaluation Report and the manufacturer's installation instructions, when required by the code official, shall be submitted at the time of permit application.

7.2 Loading conditions, calculations, and other design details for each project shall be submitted to the code official verifying that the joists comply with the applicable Code. The individual preparing such documents shall possess the necessary credentials regarding competency and qualifications as required by the applicable code and the professional registration laws of the state where the construction is undertaken.

7.3 The allowable design properties, allowable loads and spans for floors and roofs given in this report shall not be exceeded.

7.4 Minimum design loads shall be determined in accordance with the applicable code and deflections under design load conditions shall not exceed those stated in the applicable code.

7.5 SI / PRI Series I- Joists shall be installed so that loads are applied parallel with the web and no concentrated loads are applied to the bottom chord.

7.6 No cutting or notching of the flanges shall be permitted and holes in the webs shall conform to the requirements given in the Tables at the end of this report.

7.7 No field or licensee fabrication is permitted under this Evaluation Report.

7.8 For I-Joist with PRI prefix, use load and span Tables in APA's "PRI-400 Performance Standard for APA EWS I-Joists", dated March 2002, and ICC-ES report number ESR-1405.

7.9 This report is subject to periodic re-examination. For information on the current status of this report, contact the ICC-ES.

Depth	Joist Designation	EI ^(b) 10 ⁶ lbf-in. ²	M		V ^(e) lbf	IR ^(f) lbf	ER ^(g) lbf	K ^(h) 10 ⁶ lbf
			Non-repetitive ^(c) lbf-ft	Repetitive ^(d) lbf-ft				
9-1/4"	SI-40	182	2,505	2,680	1,080	2,160	1,030	4.81
	SI-60	219	3,430	3,670	1,080	2,160	1,030	4.81
9-1/2"	SI-40	193	2,585	2,765	1,120	2,160	1,080	4.94
	SI-60	231	3,540	3,790	1,120	2,160	1,080	4.94
11-1/4"	SI-40	292	3,145	3,370	1,350	2,500	1,160	5.85
	SI-60	350	4,310	4,615	1,350	2,500	1,160	5.85
	SI-80	484	6,105	6,535	1,350	2,760	1,220	5.85
11-7/8"	SI-40	330	3,350	3,585	1,420	2,500	1,200	6.18
	SI-60	396	4,585	4,910	1,420	2,500	1,200	6.18
	SI-80	547	6,495	6,950	1,420	2,760	1,280	6.18
14"	SI-60	584	5,525	5,910	1,710	2,500	1,200	7.28
	SI-80	802	7,825	8,370	1,710	3,020	1,280	7.28
16"	SI-60	799	6,405	6,855	1,970	2,500	1,200	8.32
	SI-80	1,092	9,070	9,705	1,970	3,020	1,280	8.32

(a) 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 durations as permitted by the code.

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

(c) Moment capacity (M) of a single I-joist.

(d) Moment capacity (M) when I-joists are in contact or spaced not more than 24 inches on centers, are not less than 3 in number, and are joined by floor, roof, or other load distributing elements adequate to support the design load, repetitive moment shall be permitted for use in design.

(e) Shear capacity (V) of the I-joist.

(f) Intermediate reaction (IR) of the I-joist with a minimum bearing length of 3-1/2 inches without bearing stiffeners.

(g) End reaction (ER) of the I-joist with a minimum bearing length of 1-3/4 inches without bearing stiffeners. Higher end reactions are permitted. For a bearing length of 4 inches the end reaction may be set equal to the tabulated shear value. Interpolation of the end reaction between 1-3/4 and 4-inch bearing is permitted. For end reaction values over 1,550 lbf, bearing stiffeners are required.

SI Units: 1 inch = 25.4 mm; 1 ft. = 304.8 mm; 1 ft-lb. = 1.356 N-m; 1 lb = 4.448 N; 1 in²-lb = 0.00287 N-m²

Joist Series	Depths (in.)	Flange Width (in.)	Flange Thickness (in.)	Web Thickness (in.)
SI – 40	9-1/4, 9-1/2, 11-1/4, 11-7/8	2-1/2	1-1/2	3/8
SI – 60	9-1/4, 9-1/2, 11-1/4, 11-7/8, 14, 16	2-1/2	1-1/2	3/8
SI – 80	11-1/4, 11-7/8, 14, 16	3-1/2	1-1/2	3/8

SI Units: 1 inch = 25.4 mm; 1 ft. = 304.8 mm; 1 ft-lb. = 1.356 N-m; 1 lb = 4.448 N; 1 in²-lb = 0.00287 N-m²

Depth	Joist Designation	Simple Spans			
		On Center Spacing			
		12"	16"	19.2"	24"
9-1/4"	SI-40	17'-8"	16'-2"	15'-3"	14'-3"
	SI-60	18'-7"	17'-0"	16'-0"	14'-11"
9-1/2"	SI-40	18'-0"	16'-5"	15'-6"	14'-6"
	SI-60	18'-11"	17'-4"	16'-4"	15'-3"
11-1/4"	SI-40	20'-7"	18'-10"	17'-9"	16'-3"
	SI-60	21'-9"	19'-10"	18'-8"	17'-5"
	SI-80	23'-11"	21'-9"	20'-6"	19'-1"
11-7/8"	SI-40	21'-5"	19'-7"	18'-6"	16'-9"
	SI-60	22'-7"	20'-8"	19'-6"	18'-2"
	SI-80	24'-11"	22'-8"	21'-4"	19'-10"
14"	SI-60	25'-9"	23'-6"	22'-2"	20'-8"
	SI-80	28'-3"	25'-9"	24'-3"	22'-7"
16"	SI-60	28'-6"	26'-0"	24'-7"	22'-10"
	SI-80	31'-4"	28'-6"	26'-10"	25'-0"

(a) Allowable clear span applicable to simple-span residential floor construction with a design dead load of 10 psf and live load of 40 psf. The live load deflection is limited to span/480.

(b) Spans are based on a composite floor with glued-nailed sheathing meeting the requirements for 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.

(c) Minimum bearing length shall be 1-3/4 inches for the end bearings.

(d) Bearing stiffeners are not required when I-joists are used with the spans and spacings given in this table, except as required by hanger manufacturers.

SI Units: 1 inch = 25.4 mm; 1 ft. = 304.8 mm; 1 ft-lb. = 1.356 N-m; 1 lb = 4.448 N; 1 in²-lb = 0.00287 N-m²

Depth	Joist Designation	Multiple Spans			
		On Center Spacing			
		12"	16"	19.2"	24"
9-1/4"	SI-40	19'-3"	17'-7"	16'-2"	14'-5"
	SI-60	20'-3"	18'-6"	17'-5"	16'-3"
9-1/2"	SI-40	19'-7"	17'-11"	16'-5"	14'-8"
	SI-60	20'-8"	18'-10"	17'-9"	16'-6"
11-1/4"	SI-40	22'-5"	19'-11"	18'-2"	16'-2"
	SI-60	23'-8"	21'-7"	20'-4"	18'-11"
	SI-80	26'-0"	23'-8"	22'-3"	20'-9"
11-7/8"	SI-40	23'-5"	20'-6"	18'-9"	16'-9"
	SI-60	24'-8"	22'-6"	21'-2"	19'-7"
	SI-80	27'-1"	24'-8"	23'-3"	21'-7"
14"	SI-60	28'-0"	25'-7"	24'-1"	19'-9"
	SI-80	30'-10"	28'-0"	26'-5"	23'-11"
16"	SI-60	31'-1"	28'-4"	24'-9"	19'-9"
	SI-80	34'-2"	31'-1"	29'-3"	23'-11"

(a) Allowable clear span applicable to multiple-span residential floor construction with a design dead load of 10 psf and live load of 40 psf. The end spans shall be 40% or more of the adjacent span. The live load deflection is limited to span/480.

(b) Spans are based on a composite floor with glued-nailed sheathing meeting the requirements for 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.

(c) Minimum bearing length shall be 1-3/4 inches for the end bearings, and 3-1/2 inches for the intermediate bearings.

(d) Bearing stiffeners are not required when I-joists are used with the spans and spacings given in this table, except as required by hanger manufacturers.

SI Units: 1 inch = 25.4 mm; 1 ft. = 304.8 mm; 1 ft-lb. = 1.356 N-m; 1 lb = 4.448 N; 1 in²-lb = 0.00287 N-m²

Table 5. Table of allowable hole size.

**Minimum Distance from Face of any Joist Support to Center of Hole –
Single or Multi-Span, 10 psf dead load and 40 psf live load**

		Minimum Distance from Inside Face of Any Support to Center of Hole (ft – in.)														
		Round Hole Diameter (in.)														
Joist Depth	Joist Designation	2	3	4	5	6	6-1/4	7	8	8-5/8	9	10	10-3/4	11	12	12-3/4
9-1/4"	SI-40	1'-0"	2'-0"	3'-6"	5'-0"	6'-6"										
	SI-60	2'-0"	3'-6"	4'-6"	6'-0"	7'-6"										
9-1/2"	SI-40	0'-6"	2'-0"	3'-0"	4'-6"	6'-0"	6'-6"									
	SI-60	2'-0"	3'-0"	4'-6"	6'-0"	7'-6"	8'-0"									
11-1/4"	SI-40	0'-6"	0'-6"	2'-0"	3'-0"	4'-6"	5'-0"	6'-0"	8'-0"							
	SI-60	1'-0"	2'-6"	3'-6"	5'-0"	6'-6"	7'-0"	8'-0"	9'-6"							
	SI-80	2'-6"	3'-6"	5'-0"	6'-6"	8'-0"	8'-0"	9'-6"	11'-0"							
11-7/8"	SI-40	0'-6"	0'-6"	1'-6"	2'-6"	4'-0"	4'-6"	5'-6"	7'-0"	8'-0"						
	SI-60	1'-0"	2'-0"	3'-6"	4'-6"	6'-0"	6'-6"	7'-6"	9'-0"	10'-0"						
	SI-80	2'-0"	3'-6"	4'-6"	6'-0"	7'-6"	8'-0"	9'-0"	10'-6"	11'-6"						
14"	SI-60	0'-6"	0'-6"	0'-6"	2'-0"	3'-6"	3'-6"	5'-0"	6'-6"	8'-0"	8'-6"	10'-6"	12'-0"			
	SI-80	0'-6"	2'-0"	3'-0"	4'-6"	6'-0"	6'-6"	7'-6"	9'-0"	10'-0"	10'-6"	12'-6"	14'-0"			
16"	SI-60	0'-6"	0'-6"	0'-6"	0'-6"	0'-6"	1'-0"	2'-0"	3'-6"	4'-6"	5'-6"	7'-6"	9'-0"	9'-6"	12'-0"	14'-0"
	SI-80	0'-6"	0'-6"	0'-6"	2'-0"	3'-6"	4'-0"	5'-0"	6'-6"	8'-0"	8'-6"	10'-6"	12'-0"	12'-6"	14'-6"	16'-0"

Notes:

- Above tables may be used for I-joist spacing of 24 inches on center or less.
- Hole location distance is measured from inside face of supports to center of hole.
- Distances in this chart are based on uniformly loaded joists that meet the span requirements in Tables 3 and 4.
- For continuous joists with more than one span, use the longest span to determine hole location in either span.

SI Units: 1 inch = 25.4 mm; 1 ft. = 304.8 mm; 1 ft-lb. = 1.356 N-m; 1 lb = 4.448 N; 1 in²-lb = 0.00287 N-m²