

# Joint Evaluation Report

**ESR-1742**

Reissued April 2019

Revised August 2020

This report is subject to renewal April 2021

[www.icc-es.org](http://www.icc-es.org) | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**

**Section: 06 17 33—Wood I-joists**

**REPORT HOLDER:**

**NORDIC STRUCTURES**

**EVALUATION SUBJECT:**

**NORDIC JOIST PREFABRICATED I-JOISTS**

## 1.0 EVALUATION SCOPE

### 1.1 Compliance with the following codes:

- 2018, 2015 and 2012 *International Building Code*® (IBC)
- 2018, 2015 and 2012 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

### Properties evaluated:

- Structural
- Fire resistance

### 1.2 Evaluation to the following green code(s) and/or standards:

- 2019 California Green Building Standards Code (CALGreen), Title 24, Part 11
- 2015, 2012 and 2008 ICC 700 *National Green Building Standard*™ (ICC 700-2015, ICC 700-2012 and ICC 700-2008)

### Attributes verified:

See Section 3.1.

## 2.0 USES

Nordic joist prefabricated I-Joists are used as floor joists, roof rafters, rim joists and blocking panels to support code-required loads.

## 3.0 DESCRIPTION

### 3.1 General:

The Nordic Joist prefabricated I-joists described in this report have solid-sawn or glued laminated lumber flanges and oriented strand board (OSB) webs. The top and bottom flanges are parallel, creating a constant-depth I-joist. The web-to-web connection of adjacent OSB panels is jointed and glued to form a continuous web. The web-to-flange connection is a proprietary, glued, tongue-and-groove joint. Joist depths vary from 7<sup>7</sup>/<sub>8</sub> inches to 24 inches (200 mm to

610 mm). See Tables 1 and 2 for I-joist descriptions and design properties, respectively.

The attributes of the wood joists have been verified as conforming to the provisions of (i) CALGreen Sections A4.404.3 for efficient framing techniques; (ii) ICC 700-2015 and ICC 700-2012 Section 608.1(2), 11.608.1(2) and 12(A).608.1 for resource-efficient materials; and (iii) ICC 700-2008 Section 607.1(2) for resource-efficient materials. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

### 3.2 Materials:

**3.2.1 Flanges:** Flange material for all I-joist series except the NI-20 and NI-90x is spruce-pine-fir (SPF), machine-stress-rated (MSR), finger-joined lumber. Flange material for the NI-20 series is visually graded lumber, and flange material for the NI-90x series is glued laminated lumber, manufactured in accordance with the manufacturer's (Nordic Structures) quality control manual.

**3.2.2 Webs:** Webs are 3/8-inch-thick (9.5 mm) or 7/16-inch-thick (11.1 mm) OSB panels conforming with Structural I, Exposure 1, performance-rated panel requirements as noted in DOC PS 2 and the approved manufacturer's quality control manual.

**3.2.3 Adhesive:** Exterior-type adhesives used in I-joist fabrication comply with ASTM D2559, are tested in accordance with ASTM D7247, and meet the heat durability requirements of ASTM D5055.

## 4.0 DESIGN AND INSTALLATION

### 4.1 General:

Drawings and/or specifications for the erection of the Nordic I-joists must be submitted to the code official. These documents and this report must be strictly adhered to, and copies of these documents must be available at all times on the jobsite during installation.

### 4.2 Design Properties:

Design properties for the Nordic I-joists are noted in Table 2. Duration of load adjustments to the tabulated values for allowable shear and moment are applicable in accordance with the *National Design Specification*® for Wood Construction (NDS).

When joists are used as simple span members, the design shear to be resisted must be taken as equal to the calculated end reaction for the joists. When joists are used as uniformly

loaded multiple span members, continuous over one or more interior supports, or in applications involving cantilevers, the design shear must be taken as the maximum shear at the face of the supports, using standard engineering and loading principles.

Midspan deflections for a uniformly loaded simple span condition or a simple span condition with a concentrated load at midspan must be calculated using the equations given in the notes to Table 2.

#### 4.3 Web Hole Size and Location:

Holes may be field-cut in the Nordic I-Joist's web in accordance with the limitations set forth in Figure 1 and Table 3. These provisions apply to uniformly loaded, simple or multiple span Nordic I-joists when dead loads do not exceed 10 psf (0.5 kN/m<sup>2</sup>) and live loads do not exceed 40 psf (1.9 kN/m<sup>2</sup>).

#### 4.4 One-hour Fire-resistive Floor-ceiling or Roof-Ceiling Assemblies:

I-joists may be used as wood structural framing members in one-hour fire-resistive floor-ceiling assemblies when the assemblies are constructed in accordance with Sections 4.4.1 through 4.4.4 of this report.

**4.4.1 Assembly 1:** The I-joists are permitted to be used in the one-hour fire-resistive floor-ceiling assemblies described in ICC-ES evaluation report [ESR-1405](#), Section 4.2.2.1.

**4.4.2 Assembly 2:** The I-joists are permitted to be used in lieu of the wood joists or trusses in the one-hour floor-ceiling assembly described in ICC-ES evaluation report [ESR-1338](#), Section 4.2.2.4.

**4.4.3 Assembly 3:** The I-joists are permitted to be used in the one-hour fire-resistive floor-ceiling assemblies described in ICC-ES evaluation report [ESR-1405](#), Section 4.2.2.3.

**4.4.4 Other Fire-resistive Assemblies:** The I-joists described in this report may be used in the assemblies described in the IBC Table 721.1(3), Item Numbers 23-1.1 through 28-1.1, provided the I-joists used meet the criteria described in the table's "Floor or Roof Construction" column.

#### 4.5 Fire Protection of Floors:

The NI-40x (Joist depths of 9<sup>1</sup>/<sub>2</sub>, 11<sup>7</sup>/<sub>8</sub>, and 14 inches), NI-60 (Joist depths of 9<sup>1</sup>/<sub>2</sub>, 11<sup>7</sup>/<sub>8</sub>, 14, and 16 inches), and NI-80 (Joist depths of 9<sup>1</sup>/<sub>2</sub>, 11<sup>7</sup>/<sub>8</sub>, and 16 inches) prefabricated I-Joists in Table 1 may be used in fire protected load-bearing floor/ceiling assemblies, where the I-joists are exposed, spaced a maximum 24 inches on center and their webs are protected with 7/16-inch OSB panels, running the entire length of the joist. Each OSB panel is fastened with two rows of 1/2- x 1-inch construction staples, 9 inches on center, 1 inch from the flange edge. Penetration and openings shall be permitted in accordance with the limitations set forth in Figure 1 and Table 3.

The assembly in this section meet the Exception 4 to 2018 and 2015 IRC Section R302.13, and to 2012 IRC Section 501.3.

**4.6 I-Joist Flanges:** Flanges must not be cut.

#### 4.7 Bearing Stiffeners:

Bearing stiffeners must be provided at end and interior supports when required by Table 2. Such stiffeners must be installed, when required, and must be of the type shown in Figure 2.

#### 4.8 Web Stiffeners:

Field-installed web stiffeners are required at points of concentrated loads when required by Figure 2. Such

stiffeners, when required, must be of the type shown in Table 4, and must be installed in accordance with Figure 2.

#### 4.9 Bearing Lengths:

Ends of joists must be provided with a minimum of 1<sup>3</sup>/<sub>4</sub> inches (45 mm) of bearing length, in accordance with Table 2.

Interior supports must be provided with a minimum of 3<sup>1</sup>/<sub>2</sub> inches (89 mm) of bearing length, in accordance with Table 2.

#### 4.10 Diaphragms:

The Nordic I-joists may be used in the construction of horizontal wood diaphragms to resist wind and seismic loads in accordance with the allowable shear loads of Table 5 and applicable footnotes.

#### 4.11 Rim Joists and Blocking Panels:

The Nordic I-joists may be used as the boundary members (rim joists) for diaphragm applications provided in Table 5 and as rim joists to transfer the uniform vertical loads provided in Table 2 and lateral loads provided in Table 5 for each joist series. The vertical load capacity values for each series are applicable to the Nordic I-joists used as blocking panels.

### 5.0 CONDITIONS OF USE

The Nordic Joist Prefabricated 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 For applications based on Tables 1 through 3, and Table 5, design calculations and details for specific applications must be furnished to the code official. Calculations and drawings must 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.
- 5.2 No cutting of the flanges is permitted, and holes in the webs must conform to the requirements given in Figure 1 and Table 3.
- 5.3 I-joists are permitted in dry-use service conditions only.
- 5.4 I-joists are manufactured at the Chantiers Chibougamau Ltd. facility in Chibougamau, Quebec, Canada, with quality control inspections by ICC-ES.

### 6.0 EVIDENCE SUBMITTED

Data in accordance with ICC-ES Acceptance Criteria for Prefabricated Wood I-joists (AC14), dated June 2019.

Data in accordance with ICC-ES Acceptance Criteria for Rim Board Products (AC124), dated June 2019 (editorially revised February 2020).

### 7.0 IDENTIFICATION

- 7.1 Each I-joist must be marked with the product trade name; the joist series; the production date; the evaluation report number (ESR-1742); the name of the manufacturer (Nordic Structures); and the plant location or number.
- 7.2 The report holder's contact information is the following:

**NORDIC STRUCTURES**  
**100-1100, AVENUE DES CANADIENS-DE-**  
**MONTREAL**  
**MONTREAL (QUEBEC) H3B 2S2**  
**CANADA**  
**(514) 871-8526**  
[www.nordic.ca](http://www.nordic.ca)  
[info@nordic.ca](mailto:info@nordic.ca)

TABLE 1—NORDIC I-JOIST PREFABRICATED WOOD I-JOISTS

SERIES	JOIST DEPTH (inches)	FLANGE MATERIAL	FLANGE DIMENSIONS Width x Depth (inches)	FLANGE SPECIFIC GRAVITY	WEB MATERIAL
NI-20	9 <sup>1</sup> / <sub>4</sub> – 11 <sup>7</sup> / <sub>8</sub>	Visually Graded No. 2 SPF	2.5 × 1.5	0.42	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-40	9 <sup>1</sup> / <sub>2</sub> – 16	MSR 1650f-1.5E	2.5 × 1.5	0.42	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-40x	7 <sup>7</sup> / <sub>8</sub> – 16	Enhanced <sup>1</sup> MSR 1650f-1.5E	2.5 × 1.5	0.42	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-60	7 <sup>7</sup> / <sub>8</sub> – 18	MSR 2100f-1.8E	2.5 × 1.5	0.46	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-70	9 <sup>1</sup> / <sub>2</sub> – 16	MSR 1950f-1.7E	3.5 × 1.5	0.42	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-80	7 <sup>7</sup> / <sub>8</sub> – 16	MSR 2100f-1.8E	3.5 × 1.5	0.46	3 <sup>3</sup> / <sub>8</sub> " OSB
NI-80x	18 – 24	MSR 2100f-1.8E	3.5 × 1.5	0.46	7 <sup>1</sup> / <sub>16</sub> " OSB
NI-90	11 <sup>7</sup> / <sub>8</sub> – 16	Enhanced <sup>1</sup> MSR 2400f-2.0E	3.5 × 1.5	0.50	7 <sup>1</sup> / <sub>16</sub> " OSB
NI-90x	11 <sup>7</sup> / <sub>8</sub> – 16	Glued Laminated Lumber	3.5 x 2.0	0.42	7 <sup>1</sup> / <sub>16</sub> " OSB

For SI: 1 inch = 25.4 mm.

<sup>1</sup>“Enhanced” flange material refers to a proprietary grade conforming to additional grading rules specified in the approved quality control manual.

TABLE 2—DESIGN PROPERTIES FOR NORDIC I-JOISTS <sup>1, 2</sup>

DEPTH (inches)	JOIST SERIES	EI <sup>3</sup> (10 <sup>6</sup> lb-in <sup>2</sup> )	M <sub>r</sub> <sup>4</sup> (lb-ft)	V <sub>r</sub> <sup>5</sup> (lb)	REFERENCE DESIGN REACTION, R <sub>r</sub> (lb)								VLC <sup>10,11</sup> (lb/ft)	K <sup>9</sup> (10 <sup>6</sup> lb)
					Intermediate Reaction (lb) <sup>6</sup>				End Reaction (lb) <sup>7, 8</sup>					
					3 <sup>1</sup> / <sub>2</sub> -inch		5 <sup>1</sup> / <sub>2</sub> -inch		1 <sup>3</sup> / <sub>4</sub> -inch		4-inch			
					w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS		
7 <sup>7</sup> / <sub>8</sub>	NI-40x	138	2,310	880	2,010	2,010	2,010	2,010	880	880	880	880	2,000	4.10
	NI-60	147	3,030	880	2,010	2,010	2,010	2,010	880	880	880	880	2,000	4.10
	NI-80	204	4,285	880	2,010	2,010	2,010	2,010	880	880	880	880	2,000	4.10
9 <sup>1</sup> / <sub>4</sub>	NI-20	138	2,510	1,080	2,350	2,360	2,510	2,510	1,015	1,015	1,080	1,080	2,000	4.81
	NI-40x	198	2,810	1,170	2,350	2,360	2,535	2,550	1,135	1,135	1,170	1,170	2,000	4.81
	NI-60	217	3,680	1,170	2,350	2,375	2,540	2,550	1,135	1,135	1,170	1,170	2,000	4.81
	NI-80	304	5,215	1,170	2,350	2,570	2,580	2,580	1,170	1,170	1,170	1,170	2,000	4.81
9 <sup>1</sup> / <sub>2</sub>	NI-20	145	2,590	1,120	2,410	2,425	2,575	2,575	1,035	1,035	1,120	1,120	2,000	4.94
	NI-40	193	2,735	1,200	2,410	2,425	2,630	2,645	1,175	1,200	1,200	1,200	2,000	4.94
	NI-40x	218	2,900	1,200	2,410	2,425	2,630	2,645	1,175	1,200	1,200	1,200	2,000	4.94
	NI-60	231	3,810	1,200	2,415	2,440	2,635	2,665	1,175	1,200	1,200	1,200	2,000	4.94
	NI-70	304	5,120	1,200	2,415	2,670	2,685	2,685	1,200	1,200	1,200	1,200	2,000	4.94
	NI-80	324	5,385	1,200	2,415	2,670	2,685	2,685	1,200	1,200	1,200	1,200	2,000	4.94
11 <sup>1</sup> / <sub>4</sub>	NI-20	222	3,155	1,340	2,845	2,870	3,045	3,045	1,190	1,190	1,340	1,340	2,000	5.85
	NI-40x	313	3,535	1,410	2,845	2,870	3,300	3,330	1,250	1,410	1,410	1,410	2,000	5.85
	NI-60	347	4,630	1,410	2,850	2,905	3,310	3,375	1,250	1,410	1,410	1,410	2,000	5.85
	NI-80	484	6,560	1,410	2,850	3,155	3,410	3,410	1,330	1,410	1,410	1,410	2,000	5.85
11 <sup>7</sup> / <sub>8</sub>	NI-20	253	3,355	1,420	3,000	3,030	3,215	3,215	1,245	1,245	1,420	1,420	2,000	6.18
	NI-40	330	3,545	1,480	3,000	3,030	3,540	3,575	1,275	1,480	1,480	1,480	2,000	6.18
	NI-40x	371	3,760	1,480	3,000	3,030	3,540	3,575	1,275	1,480	1,480	1,480	2,000	6.18
	NI-60	396	4,935	1,480	3,005	3,070	3,550	3,625	1,275	1,480	1,480	1,480	2,000	6.18
	NI-70	515	6,635	1,480	3,005	3,330	3,670	3,670	1,350	1,480	1,480	1,480	2,000	6.18
	NI-80	547	6,980	1,480	3,005	3,330	3,670	3,670	1,350	1,480	1,480	1,480	2,000	6.18
	NI-90	601	8,780	1,925	3,355	3,355	3,670	3,670	1,400	1,480	1,885	1,925	2,000	6.18
	NI90x	615	9,465	2,055	4,170	4,170	4,170	4,170	1,765	2,055	1,885	2,055	2,000	6.18

(Continued)

TABLE 2—DESIGN PROPERTIES FOR NORDIC I-JOISTS <sup>1,2</sup> (CONTINUED)

DEPTH (inches)	JOIST SERIES	EI <sup>3</sup> (10 <sup>6</sup> lb-in <sup>2</sup> )	M <sub>r</sub> <sup>4</sup> (lb-ft)	V <sub>r</sub> <sup>5</sup> (lb)	REFERENCE DESIGN REACTION, R <sub>r</sub> (lb)								VLC <sup>10,11</sup> (lb/ft)	K <sup>9</sup> (10 <sup>6</sup> lb)
					Intermediate Reaction (lb) <sup>6</sup>				End Reaction (lb) <sup>7,8</sup>					
					3 <sup>1</sup> / <sub>2</sub> -inch		5 <sup>1</sup> / <sub>2</sub> -inch		1 <sup>3</sup> / <sub>4</sub> -inch		4-inch			
					w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS		
14	NI-40	482	4,270	1,730	3,130	3,160	3,530	3,565	1,325	1,690	1,550	1,730	2,000	7.28
	NI-40x	540	4,530	1,730	3,130	3,160	3,530	3,565	1,325	1,690	1,550	1,730	2,000	7.28
	NI-60	584	5,945	1,730	3,140	3,260	3,540	3,795	1,345	1,690	1,550	1,730	2,000	7.28
	NI-70	749	7,990	1,730	3,330	3,640	3,820	4,075	1,455	1,690	1,550	1,730	2,000	7.28
	NI-80	802	8,405	1,730	3,330	3,640	3,820	4,075	1,455	1,690	1,550	1,730	2,000	7.28
	NI-90	877	10,570	2,125	3,355	3,640	3,820	4,075	1,455	1,690	1,885	2,125	2,000	7.28
	NI-90x	910	11,415	2,210	4,170	4,170	4,170	4,170	1,800	2,210	1,885	2,210	2,000	7.28
16	NI-40	657	4,950	1,970	3,255	3,285	3,520	3,555	1,370	1,875	1,550	1,970	2,000	8.32
	NI-40x	734	5,250	1,970	3,255	3,285	3,520	3,555	1,370	1,875	1,550	1,970	2,000	8.32
	NI-60	799	6,895	1,970	3,265	3,440	3,530	3,955	1,410	1,875	1,550	1,970	2,000	8.32
	NI-70	1,015	9,265	1,970	3,640	3,930	3,960	4,455	1,550	1,875	1,550	1,970	2,000	8.32
	NI-80	1,092	9,745	1,970	3,640	3,930	3,960	4,455	1,550	1,875	1,550	1,970	2,000	8.32
	NI-90	1,187	12,260	2,330	3,640	3,930	3,960	4,455	1,550	1,875	1,885	2,330	2,000	8.32
	NI-90x	1,245	13,100	2,325	4,170	4,170	4,170	4,170	1,830	2,325	1,885	2,325	2,000	8.32
18	NI-60	1,019	7,800	2,000	2,800	3,620	3,260	4,115	1,475	2,000	1,850	2,000	1,850	9.36
	NI-80x	1,399	10,990	2,360	3,115	3,820	3,280	4,420	1,300	1,900	1,850	2,360	1,275	9.36
20	NI-80x	1,771	12,315	2,450	3,190	4,120	3,410	4,575	1,320	2,045	1,900	2,450	1,275	10.40
22	NI-80x	2,191	13,645	2,530	3,265	4,425	3,535	4,730	1,340	2,195	1,950	2,530	1,275	11.44
24	NI-80x	2,660	14,975	2,600	3,340	4,725	3,665	4,885	1,360	2,340	2,000	2,600	1,275	12.48

For SI: 1 inch = 25.4 mm, 1 lb = 4.448 N, 1 ft-lb = 1.35 N-m, 1 lb-in<sup>2</sup> = 179 N-mm<sup>2</sup>.

<sup>1</sup>The tabulated values are design values for normal duration of load (10 years). All values, except for EI and K, are permitted to be adjusted for other durations of load in accordance with the NDS. Reference design reaction values, R<sub>r</sub>, may be adjusted for other durations of load in accordance with the NDS, provided the adjusted design reaction value, (R<sub>r</sub>), does not exceed the adjusted flange bearing capacity, (P<sub>c</sub>), calculated as follows:

$$P_c = F_{cp} C_b l_b (w_f - 0.15)$$

- where: F<sub>cp</sub> = 425 psi for end reactions, 470 psi for 3<sup>1</sup>/<sub>2</sub>-inch intermediate reactions, and 454 psi for 5<sup>1</sup>/<sub>2</sub>-inch intermediate reactions.
- C<sub>b</sub> = Bearing area factor as defined in Section 3.10.4 of the NDS, if applicable.
- l<sub>b</sub> = Bearing length of the I-joist in inches.
- w<sub>f</sub> = Bearing width of the flange in inches (see Table 1).
- 0.15 = Allowance for the flange edge easing

<sup>2</sup>The vertical load capacity (VLC), for transfer of vertical uniform loads when I-joists are used as continuously-supported blocking, for Nordic I-joists without web stiffeners is 2000 lb/ft for I-joist depths up to 16 inches, 1850 lb/ft for the 18-inch NI-60 series, and 1275 lb/ft for the NI-80x series having depths from 18 inches to 24 inches. The VLC values must be decreased for permanent loads per the NDS, but are not permitted to be increased for shorter durations.

<sup>3</sup>Reference design bending stiffness (EI) of the I-joist.

<sup>4</sup>Reference design moment, (M<sub>r</sub>) of the I-joist. The repetitive-member-use factor, (C<sub>r</sub>) equals 1.0 in all cases.

<sup>5</sup>Reference design shear, (V<sub>r</sub>) of the I-joist.

<sup>6</sup>Intermediate reaction design values require a minimum bearing length of 3<sup>1</sup>/<sub>2</sub> inches or 5<sup>1</sup>/<sub>2</sub> inches, as shown. Values are given for applications with web stiffeners (w/ WS), and without web stiffeners (w/o WS). Where required, web stiffeners must be installed in accordance with Figure 2 and Table 4.

<sup>7</sup>End reaction design values require a minimum bearing length of 1<sup>3</sup>/<sub>4</sub> inches or 4 inches, as shown. Values are given for applications with web stiffeners (w/ WS), and without web stiffeners (w/o WS). Where required, web stiffeners must be installed in accordance with Figure 2 and Table 4.

<sup>8</sup>Reaction capacity shall be permitted to be increased over that tabulated for the minimum bearing length by linear interpolation of the reaction capacity between the minimum and maximum bearing lengths. Extrapolation beyond the minimum and maximum bearing lengths is beyond the scope of this table.

<sup>9</sup>Coefficient of shear deflection (K). For calculating uniform load and center-point load deflections of the I-joists in a simple span application, use equations 1 and 2, respectively. For all other loading and support conditions, deflection must be calculated using standard engineering formulae, accounting for both bending and shear deformation.

Simple span uniformly distributed load: 
$$\delta = \frac{5 w \ell^4}{384 EI} + \frac{w \ell^2}{K} \quad (1)$$

Simple span concentrated load at center of span: 
$$\delta = \frac{P \ell^3}{48 EI} + \frac{2 P \ell}{K} \quad (2)$$

where:

- δ = Deflection (inches)
- EI = Stiffness (moment of inertia times modulus of elasticity) (lb-in<sup>2</sup>)
- k = Shear deflection coefficient (lbs)
- ℓ = Effective span (inches)
- P = Concentrated load (lb)
- w = Uniform load (pounds per lineal inch)

<sup>10</sup>Allowable vertical-load capacity for I-joists used as blocking panels or rim boards.

<sup>11</sup>Use of I-joists with allowable vertical-load capacities less than 2,000 lb/ft is limited to engineered construction.

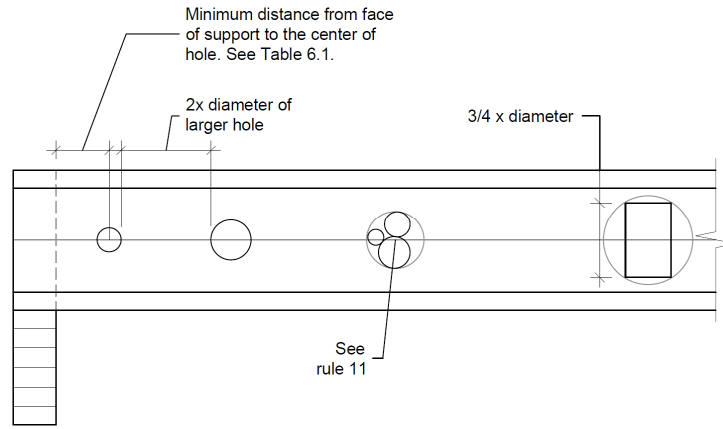


FIGURE 1—TYPICAL HOLES

**Rules for cutting holes in Nordic Joists**

1. The distance between the inside edge of the support and the centerline of any hole must be in compliance with the requirements of Table 3.
2. I-joist top and bottom flanges must NEVER be cut, notched, or otherwise modified.
3. Whenever possible, field-cut holes should be centered on the middle of the web.
4. The maximum size hole that can be cut into an I-joist web shall equal the clear distance between the flanges of the I-joist minus 1/4 inch. A minimum of 1/8 inch should always be maintained between the top or bottom of the hole and the adjacent I-joist flange.
5. The sides of square holes or longest sides of rectangular holes should not exceed three-fourths of the diameter of the maximum round hole permitted at that location.
6. Where more than one hole is necessary, the distance between adjacent hole edges shall exceed twice the diameter of the largest round hole or twice the size of the largest square hole (or twice the length of the longest side of the longest rectangular hole) and each hole must be sized and located in compliance with the requirements of Table 3.
7. Holes measuring 1 1/2 inches or smaller shall be permitted anywhere in a cantilevered section of a joist. Holes of greater size may be permitted subject to verification.
8. A 1 1/2-inch hole or smaller can be placed anywhere in the web provided that it meets the requirements of rule number 6 above.
9. All holes shall be cut in a workman-like manner in accordance with the restrictions listed above and as illustrated in Figure 1.
10. Limit three maximum-size holes per span.
11. A group of round holes at approximately the same location shall be permitted if it meets the requirements for a single round hole circumscribed around them.

**TABLE 3—LOCATION OF CIRCULAR HOLES IN NORDIC I-JOIST WEBS, SIMPLE OR MULTIPLE SPAN, FOR LIVE LOADS UP TO 40 psf AND DEAD LOADS UP TO 10 psf<sup>1,2,3,4</sup>**

JOIST DEPTH (in.)	JOIST SERIES	SAF <sup>5</sup> (ft-in)	MINIMUM DISTANCE FROM INSIDE FACE OF ANY SUPPORT TO CENTER OF HOLE (ft-in)														
			Round Hole Diameter (in.)														
			2	3	4	5	6	6 1/4	7	8	8 5/8	9	10	10 3/4	11	12	12 3/4
7 7/8	NI-40x	12-11	1-10	3-2	4-5		---	---	---	---	---	---	---	---	---	---	---
	NI-60	13-2	2-2	3-5	4-9		---	---	---	---	---	---	---	---	---	---	---
	NI-80	13-10	2-4	3-10	5-6		---	---	---	---	---	---	---	---	---	---	---
9 1/4	NI-20	13-3	0-7	1-6	2-10	4-2	5-8	---	---	---	---	---	---	---	---	---	---
	NI-40x	14-7	0-7	1-5	2-10	4-3	5-11	---	---	---	---	---	---	---	---	---	---
	NI-60	14-11	0-11	2-3	3-8	5-2	6-9	---	---	---	---	---	---	---	---	---	---
	NI-80	16-5	2-2	3-5	4-11	6-5	8-2	---	---	---	---	---	---	---	---	---	---
9 1/2	NI-20	13-6	0-7	1-4	2-8	3-11	5-5	5-9	---	---	---	---	---	---	---	---	---
	NI-40	14-6	0-7	1-0	2-4	3-10	5-4	5-9	---	---	---	---	---	---	---	---	---
	NI-40x	15-0	0-7	1-4	2-8	4-2	5-8	6-2	---	---	---	---	---	---	---	---	---
	NI-60	15-3	1-0	2-4	3-9	5-3	6-10	7-3	---	---	---	---	---	---	---	---	---
	NI-70	16-5	1-10	3-3	4-8	6-2	7-9	8-3	---	---	---	---	---	---	---	---	---
11 1/4	NI-80	16-9	2-0	3-5	4-10	6-4	8-0	8-5	---	---	---	---	---	---	---	---	---
	NI-20	15-5	0-7	0-8	1-4	2-6	3-11	4-3	5-4	7-0	---	---	---	---	---	---	---
	NI-40x	16-7	0-7	0-8	1-5	2-9	4-2	4-6	5-8	7-6	---	---	---	---	---	---	---
	NI-60	17-5	0-7	1-6	2-10	4-3	5-8	6-0	7-3	8-11	---	---	---	---	---	---	---
11 7/8	NI-80	19-1	1-6	2-10	4-3	5-8	7-2	7-6	8-9	---	---	---	---	---	---	---	---
	NI-20	16-1	0-7	0-8	0-10	2-0	3-4	3-9	4-9	6-3	7-5	---	---	---	---	---	---
	NI-40	16-7	0-7	0-8	0-8	1-2	2-8	3-2	4-5	6-3	7-6	---	---	---	---	---	---
	NI-40x	17-1	0-7	0-8	1-0	2-4	3-8	4-0	5-2	6-8	7-11	---	---	---	---	---	---
	NI-60	18-2	0-7	1-4	2-8	4-0	5-5	5-10	7-0	8-8	9-9	---	---	---	---	---	---
	NI-70	19-7	1-2	2-5	3-9	5-2	6-8	7-0	8-2	9-10	---	---	---	---	---	---	---
	NI-80	19-11	1-4	2-8	3-11	5-4	6-10	7-3	8-5	10-2	---	---	---	---	---	---	---
	NI-90	20-5	0-7	0-8	1-3	2-11	4-8	5-2	6-6	8-6	9-11	---	---	---	---	---	---
NI-90x	20-7	0-7	0-8	0-8	2-3	4-2	4-6	6-0	---	---	---	---	---	---	---	---	

(Continued)

**TABLE 3—LOCATION OF CIRCULAR HOLES IN NORDIC I-JOIST WEBS, SIMPLE OR MULTIPLE SPAN, FOR LIVE LOADS UP TO 40 psf AND DEAD LOADS UP TO 10 psf<sup>1,2,3,4</sup> (CONTINUED)**

JOIST DEPTH (in.)	JOIST SERIES	SAF <sup>5</sup> (ft-in)	MINIMUM DISTANCE FROM INSIDE FACE OF ANY SUPPORT TO CENTER OF HOLE (ft-in)														
			Round Hole Diameter (in.)														
			2	3	4	5	6	6 <sup>1</sup> / <sub>4</sub>	7	8	8 <sup>5</sup> / <sub>8</sub>	9	10	10 <sup>3</sup> / <sub>4</sub>	11	12	12 <sup>3</sup> / <sub>4</sub>
14	NI-40	18-3	0-7	0-8	0-8	0-9	1-8	2-0	3-0	4-4	5-3	5-10	7-5	9-2	---	---	---
	NI-40x	18-10	0-7	0-8	0-8	0-9	2-0	2-4	3-4	4-9	5-9	6-3	7-11	9-9	---	---	---
	NI-60	20-8	0-7	0-8	1-3	2-6	3-11	4-3	5-3	6-9	7-9	8-3	10-2	---	---	---	---
	NI-70	22-2	0-7	1-8	2-11	4-3	5-8	5-11	7-0	8-6	9-6	10-2	11-11	---	---	---	---
	NI-80	22-7	0-8	1-10	3-2	4-6	5-11	6-3	7-4	8-10	9-10	10-6	12-3	---	---	---	---
	NI-90	23-1	0-7	0-8	0-9	2-3	3-10	4-3	5-6	7-3	8-5	9-2	11-2	12-9	---	---	---
16	NI-40	19-8	0-7	0-8	0-8	0-9	0-9	0-9	1-4	2-8	3-5	4-0	5-5	6-6	6-11	8-8	10-8
	NI-40x	20-3	0-7	0-8	0-8	0-9	0-9	0-10	1-9	3-0	3-10	4-5	5-10	6-11	7-4	9-3	---
	NI-60	22-10	0-7	0-8	0-8	1-2	2-5	2-9	3-9	5-0	5-11	6-6	7-11	9-2	9-8	11-9	---
	NI-70	24-6	0-7	0-9	2-0	3-3	4-8	4-11	5-11	7-5	8-4	8-11	10-5	11-9	12-2	---	---
	NI-80	25-0	0-7	1-2	2-4	3-8	5-0	5-4	6-4	7-10	8-9	9-4	10-11	12-2	12-6	---	---
	NI-90	25-7	0-7	0-8	0-8	1-6	3-0	3-5	4-6	6-3	7-3	7-10	9-8	11-0	11-6	13-6	15-3
18	NI-60	22-2	0-7	0-8	0-8	0-9	0-10	1-2	2-3	3-9	4-8	5-3	6-9	7-11	8-5	10-2	11-6
18	NI-80x	24-8	0-7	0-8	0-8	0-9	0-9	0-9	1-5	3-2	4-3	4-10	6-8	8-2	8-6	10-6	12-2
20	NI-80x	25-4	0-7	0-8	0-8	0-9	0-9	0-9	0-10	1-6	2-6	3-2	4-9	6-2	6-8	8-9	10-4
22	NI-80x	25-11	0-7	0-8	0-8	0-9	0-9	0-9	0-10	0-10	1-5	2-2	3-10	5-3	5-9	7-8	9-0
24	NI-80x	26-6	0-7	0-8	0-8	0-9	0-9	0-9	0-10	0-10	0-10	0-11	2-4	3-6	3-11	5-9	7-0

For SI: 1 inch = 25.4 mm, 1 pound = 4.448 N.

<sup>1</sup>Above tables may be used for I-joist spacing of 24 inches on center or less.

<sup>2</sup>Hole location distance is measured from inside face of supports to center of hole.

<sup>3</sup>Distances in this chart are based on uniformly loaded joists.

<sup>4</sup>SAF = Span Adjustment Factor, used as defined below.

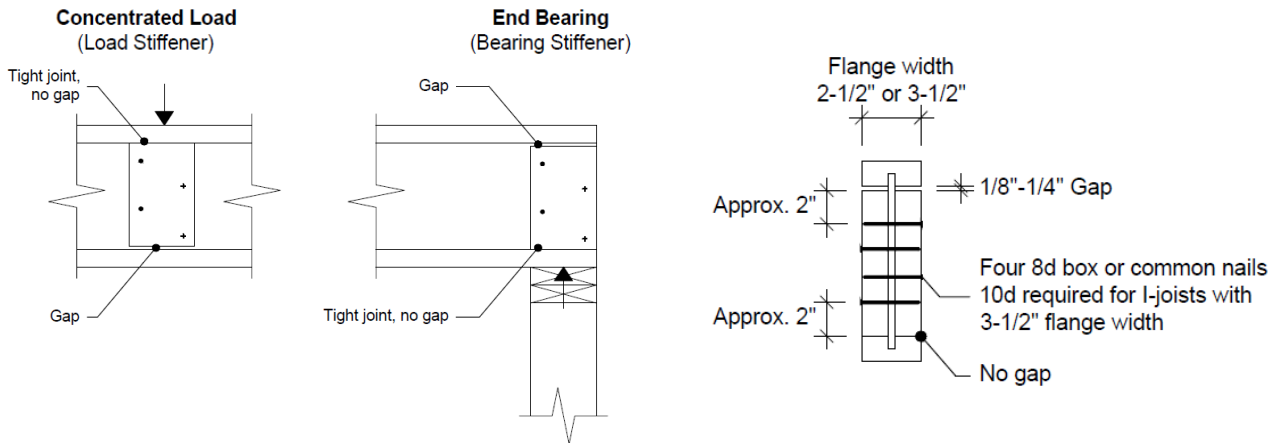
**OPTIONAL:**

Table 3 is based on the I-joists being used at their maximum span. If the I-joists are placed at less than their full allowable span, the minimum distance from the centerline of the hole to the face of any support (*D*) as given above may be reduced as follows:

$$D_{reduced} = \frac{L_{actual}}{SAF} \times D$$

- Where:
- D<sub>reduced</sub>* = Distance from the inside face of any support to center of hole, reduced for less-than-maximum span applications (ft). The reduced distance must not be less than 6 inches from the face of support to edge of the hole.
  - L<sub>actual</sub>* = The actual measured span distance between the inside faces of supports (ft).
  - SAF* = Span Adjustment Factor given in Table 3 (ft).
  - D* = The minimum distance from the inside face of any support to center of hole from Table 3 (ft).

If  $\frac{L_{actual}}{SAF}$  is greater than 1, use 1 in the above calculation for  $\frac{L_{actual}}{SAF}$ .



**Requirements for web stiffeners**

1. Web stiffeners must be placed on each side of the I-joist web at:
  - a) Hangers with side nailing.
  - b) Hangers with a side, which do not support top flanges of I-joists.
  - c) Locations where concentrated loads in excess of 1500 pounds are applied to the top flange of the I-joist between supports, or in case of cantilever, anywhere between the cantilever tip and the support.
  - d) Exterior supports in engineered applications based on Table 2.
2. Web stiffeners must be made of Utility grade SPF (south) or better for lumber and/or Sheathing grade or better for wood structural panels.

**FIGURE 2—WEB STIFFENER INSTALLATION DETAILS**

**TABLE 4—WEB STIFFENER SIZE REQUIRED**

I-JOIST FLANGE WIDTH	WEB STIFFENER SIZE REQUIRED ON EACH SIDE OF WEB
2 1/2 inches	1 × 2 <sup>5</sup> / <sub>16</sub> minimum width
3 1/2 inches	1 1/2 × 2 <sup>5</sup> / <sub>16</sub> minimum width

For SI: 1 inch=25.4 mm

**TABLE 5—ALLOWABLE SHEAR (PLF) FOR HORIZONTAL WOOD STRUCTURAL PANEL DIAPHRAGMS FRAMED WITH NORDIC I-JOISTS FOR WIND<sup>1</sup> OR SEISMIC LOADING<sup>2,3,9</sup>**

Sheathing Grade	Common Nail Size	Minimum Nominal Panel Thickness (in.)	Minimum Nominal Width of Framing Members at Adjoining Edges and Boundaries (in.) <sup>4</sup>	Blocked Diaphragms			Unblocked Diaphragms	
				Nail Spacing (in.) at Diaphragm Boundaries (All Cases), at Continuous Panel Edges Parallel to Load (Cases 3 & 4), and at All Panel Edges (Cases 5 & 6) <sup>5,6</sup>			Nails Spaced 6 in. Max at Supported Edges <sup>5</sup>	
				6	4	2-1/2 <sup>7</sup>	Case 1 (No Unblocked Edges or Continuous Joints Parallel to Load)	All Other Configurations (Cases 2, 3 4, 5 & 6)
				Nail Spacing (in.) at Other Panel Edges (Cases 1, 2, 3 & 4) <sup>5</sup>				
6	6	4						
Structural I	6d <sup>8</sup>	5/16	3	210	280	420	185	140
	8d	3/8	3	300	400	600	265	200
	10d	15/32	3	360	480	720	320	240
Sheathing and Single Floor	6d <sup>8</sup>	5/16	3	190	250	380	170	125
		3/8	3	210	280	420	185	140
	8d	3/8	3	270	360	540	240	180
		7/16	3	285	380	570	255	190
		15/32	3	300	400	600	265	200
	10d	15/32	3	325	430	650	290	215
		19/32	3	360	480	720	320	240

For SI: 1 inch = 25.4 mm; 1 plf = 14.59 N/m.

<sup>1</sup>For wind load applications, the values in the table above shall be permitted to be multiplied by 1.4.

<sup>2</sup>For shear loads of normal or permanent load duration as defined in the NDS, the values in the table above shall be multiplied by 0.63 or 0.56, respectively.

<sup>3</sup>The tabulated allowable shear capacities are for I-joist series with flanges having a specific gravity (G) of 0.50 or higher (see Table 1). For G < 0.50 the allowable shear capacities shall be reduced by multiplying the allowable shear capacities by the Specific Gravity Adjustment Factor = [1-(0.5-G)]. The Specific Gravity Adjustment Factor shall not be greater than 1.

<sup>4</sup>Minimum flange widths of Nordic I-joist framing members are 2-1/2 inches (3 inches nominal).

<sup>5</sup>Space nails maximum 12 inches o.c. along intermediate framing members (6 inches o.c. when supports are spaced 48 inches o.c. or greater). Fasteners shall be located 3/8 inch minimum from panel edges.

<sup>6</sup>When nail spacing is 4 inches on center at diaphragm boundaries, adjacent nails within a row must be offset (staggered) 1/2 inch.

<sup>7</sup>When nail spacing is 2-1/2 inches on center at adjoining panel edges, adjacent nails within a row must be offset (staggered) 1/2 inch.

<sup>8</sup>8d common nails minimum are recommended for roof panel attachments.

<sup>9</sup>See Table 4.2A of SDPWS for diaphragm configurations.

**DISCLAIMER**

APA Product Report<sup>®</sup> is a trademark of APA – *The Engineered Wood Association*, Tacoma, Washington. ICC-ES Evaluation Report is a trademark of ICC Evaluation Service, LLC (ICC-ES). The information contained herein is based on the product evaluation in accordance with the references noted in this report. Neither ICC-ES, nor APA or its members make any warranty, expressed or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report. The joint ICC-ES/APA Evaluation 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. Consult the local jurisdiction or design professional to assure compliance with code, construction, and performance requirements. Because neither APA, nor ICC-ES, has any control over quality of workmanship or the conditions under which engineered wood products are used, it cannot accept responsibility for product performance or designs as actually constructed.

# ICC-ES Evaluation Report

# ESR-1742 FBC Supplement

Reissued April 2019

Revised August 2020

This report is subject to renewal April 2021

[www.icc-es.org](http://www.icc-es.org) | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**

**Section: 06 17 33—Wood I-joists**

**REPORT HOLDER:**

**NORDIC STRUCTURES**

**EVALUATION SUBJECT:**

**NORDIC JOIST PREFABRICATED I-JOISTS**

**1.0 REPORT PURPOSE AND SCOPE**

**Purpose:**

The purpose of this evaluation report supplement is to indicate that Nordic Joist Prefabricated I-Joists, recognized in ICC-ES evaluation report ESR-1742, have also been evaluated for compliance with the codes noted below.

**Applicable code editions:**

- 2020 and 2017 *Florida Building Code—Building*
- 2020 and 2017 *Florida Building Code—Residential*

**2.0 CONCLUSIONS**

The NI Series Prefabricated I-Joists, described in Sections 2.0 through 7.0 of the evaluation report ESR-1742, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in the evaluation report ESR-1742 for the 2018 and 2015 *International Building Code*® (IBC) meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the NI Series Prefabricated I-Joists for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated and is outside the scope of this evaluation report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report ESR-1742, reissued April 2019 and revised August 2020.