

ICC-ES Evaluation Report

ESR-1742

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**DIVISION: 06 00 00—WOOD, PLASTICS AND
COMPOSITES**
Section: 06 17 33—Wood I-joists
REPORT HOLDER:

**NORDIC ENGINEERED WOOD
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EVALUATION SUBJECT:
NI SERIES PREFABRICATED WOOD I-JOISTS
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Fire-resistance rating

2.0 USES

NI Series Prefabricated Wood I-Joists are used as rafters and floor joists.

3.0 DESCRIPTION
3.1 General:

The NI series prefabricated wood 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 7¹/₈ inches to 24 inches (200 mm to 610 mm). See Tables 1 and 2, 3 and 4 for I-joist descriptions and design properties.

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 Engineered Wood) 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 Voluntary Product Standard PS2 and the approved manufacturer's quality control manual.

3.2.3 Adhesive: Exterior-type adhesives used in I-joist fabrication comply with ASTM D 2559 and Section 5.3.3 of ASTM D 5055-08a.

4.0 DESIGN AND INSTALLATION
4.1 General:

Drawings and/or specifications for the erection of the Nordic NI series 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 NI series 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:

Nordic NI series I-joists provide 1¹/₂-inch-diameter (38 mm) knockout holes at 15 inches (381 mm) on center along the length of the joists to facilitate the installation of electrical wiring or light plumbing lines. These knockouts can be removed with a hammer as needed.

If the size of the knockout holes is insufficient for the specific end-use application, larger holes may be field-cut in the web in accordance with the limitations set forth in Figure 1 and Tables 3A and 3B. These provisions apply to

uniformly loaded, simple or multiple span Nordic NI series I-joists when dead loads do not exceed 10 psf (0.5 kN/m²) for Table 3A and 15 psf (0.72 kN/m²) for Table 3B, and live loads do not exceed 40 psf (1.9 kN/m²).

4.4 I-Joist Flanges:

Flanges must not be cut.

4.5 Bearing Stiffeners:

Field-installed bearing stiffeners must be provided at points of end bearing when reactions exceed those permitted by Table 2 for unstiffened webs. Such stiffeners must be installed, when required, and must be of the type shown in Figure 2.

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

4.6 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 Figure 2, and must be installed in accordance with Figure 2.

4.7 Bearing Sizes:

Ends of joists must be provided with a minimum of 1³/₄ inches (45 mm) of bearing length.

Interior supports must be provided with a minimum of 3¹/₂ inches (89 mm) of bearing length.

4.8 Blocking Panels:

The Nordic NI Proprietary series I-joists must be restrained against lateral movement and rotation at their supports. This may be accomplished by using blocking panels or rim joists at the ends of the joists. The band joist, no matter what its composition, must be placed under the load from above so that it transmits such load to the foundation or supporting structure below.

4.9 Bracing:

Wood panel sheathing complying with the requirements of the code must be nailed or glue-nailed to the top flange of the Nordic NI Proprietary series I-joists to prevent lateral movement in service. Additionally, the top flange must be braced to prevent toppling of the beam or buckling of the top flange during construction.

4.10 One-hour Rated Floor-ceiling or Roof-ceiling Fire-resistant Assemblies:

The I-joists described in this report may be used in the assemblies described in IBC Table 720.1(3), Item Numbers 21-1.1, 23-1.1, 25-1.1, 26-1.1, 27-1.1, 28-1.1 and 29-1.1, provided the I-joists used meet the required criteria as described in the tabulated “Floor or Roof Construction” column.

5.0 CONDITIONS OF USE

The NI Series Prefabricated Wood 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 3B, 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.
- 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 APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

Data in accordance with ICC-ES Acceptance Criteria for Prefabricated Wood I-joists (AC14), dated October 2007 .

7.0 IDENTIFICATION

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 or trademark of the inspection agency (APA—The Engineered Wood Association); the name of the manufacturer (Nordic Engineered Wood); and the plant location or number.

TABLE 1— NI SERIES PREFABRICATED WOOD I-JOISTS

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

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

¹“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 ^{1,2}

DEPTH (inches)	JOIST SERIES	EI ³ (10 ⁶ lb-in ²)	M _r ⁴ (lb-ft)	V _r ⁵ (lb)	REFERENCE DESIGN REACTION, R _r (lb)								K ⁹ (10 ⁶ lb)
					Intermediate Reaction (lb) ⁶				End Reaction (lb) ^{7,8}				
					3 ¹ / ₂ -inch		5 ¹ / ₂ -inch		1 ³ / ₄ -inch		3 ¹ / ₂ -inch		
					w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS	w/o WS	w/ WS	
7 ⁷ / ₈	NI-40x	138	2310	880	1890	--	--	--	880	--	--	--	4.10
	NI-60	147	3030	880	1890	--	--	--	880	--	--	--	4.10
	NI-80	204	4285	880	1890	--	--	--	880	--	--	--	4.10
9 ¹ / ₄	NI-20	138	2510	1080	1700	--	--	--	900	--	--	--	4.81
	NI-40x	198	2810	1170	2240	--	--	--	1120	--	--	--	4.81
	NI-60	217	3680	1170	2240	--	--	--	1120	--	--	--	4.81
	NI-80	304	5215	1170	2240	--	--	--	1120	--	--	--	4.81
9 ¹ / ₂	NI-20	145	2590	1120	1700	--	--	--	900	--	--	--	4.94
	NI-40	193	2735	1120	2160	--	--	--	1080	--	--	--	4.94
	NI-40x	218	2900	1200	2240	2620	--	--	1120	--	--	--	4.94
	NI-60	231	3810	1200	2240	2620	--	--	1120	--	--	--	4.94
	NI-70	304	5120	1200	2240	2620	--	--	1120	--	--	--	4.94
	NI-80	324	5385	1200	2380	2790	--	--	1190	--	--	--	4.94
11 ¹ / ₄	NI-20	222	3155	1340	1800	--	--	--	900	--	--	--	5.85
	NI-40x	313	3535	1410	2750	--	--	--	1250	--	--	--	5.85
	NI-60	347	4630	1410	2750	--	--	--	1250	--	--	--	5.85
	NI-80	484	6560	1410	2750	--	--	--	1330	--	--	--	5.85
11 ⁷ / ₈	NI-20	253	3355	1420	1800	--	--	--	900	--	--	--	6.18
	NI-40	330	3545	1420	2500	--	--	--	1200	--	--	--	6.18
	NI-40x	371	3760	1480	2750	2930	--	--	1250	--	--	--	6.18
	NI-60	396	4935	1480	2750	2930	--	--	1250	--	--	--	6.18
	NI-70	515	6635	1480	2750	2930	--	--	1250	--	--	--	6.18
	NI-80	547	6980	1480	2900	3120	--	--	1330	--	--	--	6.18
	NI90x	615	9465	2055	4170	--	--	--	1765	--	--	--	6.18
14	NI-40	482	4270	1710	2500	--	--	--	1200	--	--	--	7.28
	NI-40x	540	4530	1730	2750	3240	--	--	1250	--	--	--	7.28
	NI-60	584	5945	1730	2750	3240	--	--	1250	--	--	--	7.28
	NI-70	749	7990	1730	2750	3240	--	--	1250	--	--	--	7.28
	NI-80	802	8405	1730	3310	3840	--	--	1330	--	--	--	7.28
	NI-90x	910	11415	2210	4170	--	--	--	1765	--	--	--	7.28
16	NI-40	657	4950	1970	2500	--	--	--	1200	--	--	--	8.32
	NI-40x	734	5250	1970	2750	3240	--	--	1250	--	--	--	8.32
	NI-60	799	6895	1970	2750	3240	--	--	1250	--	--	--	8.32
	NI-70	1015	9265	1970	2750	3240	--	--	1250	--	--	--	8.32
	NI-80	1092	9745	1970	3310	3840	--	--	1330	--	--	--	8.32
	NI-90x	1245	13100	2325	4170	--	--	--	1765	--	--	--	8.32
18	NI-60	1019	7800	2000	2800	3500	3150	4100	1300	1700	1520	1860	9.36
	NI-80x	1399	10,990	2360	3100	3700	3250	4250	1300	1900	1520	2150	9.36
20	NI-80x	1771	12,315	2450	3100	3700	3250	4250	1300	2010	1520	2250	10.40
22	NI-80x	2191	13,645	2530	3100	3700	3250	4250	1300	2130	1520	2350	11.44
24	NI-80x	2660	14,975	2600	3100	3700	3250	4250	1300	2250	1520	2440	12.48

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 reference design values for normal duration of load. Reference design moment and shear values, M_r and V_r, may be adjusted for other durations of load in accordance with the NDS. Reference design reaction values, R_r, may be adjusted for other durations of load in accordance with the NDS, provided the adjusted design reaction value, R_r', does not exceed the adjusted flange bearing capacity, P_c', calculated as follows:

$$P_c' = F_c' l_b (w_f - 0.15)$$

where: F_c' = 425 psi for end reactions, 470 psi for 3¹/₂-inch intermediate reactions, and 454 psi for 5¹/₂-inch intermediate reactions.

l_b = Bearing length in inches.

w_f = The width of the flange in inches (see Table 1).

²The allowable vertical uniform load capacity for NI series 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.

³Bending stiffness (EI) of the I-joist.

⁴Reference design moment, M_r, of the I-joist. The repetitive-member-use factor, C_r, equals 1.0 in all cases.

⁵Reference design shear, V_r, of the I-joist.

(Continued)

Notes to Table 2 (Continued)

⁶Intermediate reactions require a minimum bearing length of 3¹/₂ inches or 5¹/₂ 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.

⁷End reactions require a minimum bearing length of 1³/₄ inches or 3¹/₂ 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.

⁸For a bearing length of 4 inches, the end reaction may be set equal to the tabulated shear value, provided web stiffeners are used for the NI-90x series, and all other joists having depths 14 inches or greater. Interpolation of the end reaction between 1³/₄- and 4-inch bearing is permitted. For joists up to 16 inches deep with end reaction values greater than 1550 pounds, web stiffeners are required, with the exception of the NI-90x series, which requires web stiffeners when end reaction values exceed 1885 pounds. For the 18-inch NI-60 and the NI-80x series having depths from 18 inches to 24 inches, web stiffeners are required when end reactions exceed 1850 pounds.

⁹Coefficient 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:
$$\delta = \frac{5wl^4}{384EI} + \frac{wl^2}{k} \quad (1)$$

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

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)

TABLE 3A—LOCATION OF CIRCULAR HOLES IN NI-SERIES I-JOIST WEBS, SIMPLE OR MULTIPLE SPAN, FOR LIVE LOADS UP TO 40 psf AND DEAD LOADS UP TO 10 psf^{1,2,3,4}

JOIST DEPTH (in.)	JOIST SERIES	SAF ⁵ (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	13-5	2-6	3-6	5-0	6-6	---	---	---	---	---	---	---	---	---	---	
	NI-60	13-10	2-6	4-0	5-0	6-6	---	---	---	---	---	---	---	---	---	---	
	NI-80	13-10	2-6	4-6	6-0	8-0	---	---	---	---	---	---	---	---	---	---	
9 ¹ / ₄	NI-20	13-5	0-6	1-6	3-0	4-0	6-0	---	---	---	---	---	---	---	---	---	
	NI-40x	14-9	0-6	1-6	3-0	4-6	6-0	---	---	---	---	---	---	---	---	---	
	NI-60	16-2	1-6	2-6	4-0	5-6	7-0	---	---	---	---	---	---	---	---	---	
	NI-80	17-8	2-6	3-6	5-0	6-6	8-6	---	---	---	---	---	---	---	---	---	
9 ¹ / ₂	NI-20	13-5	0-6	1-0	2-6	3-6	5-6	6-0	---	---	---	---	---	---	---	---	
	NI-40	14-7	0-6	2-0	3-0	4-6	6-6	6-6	---	---	---	---	---	---	---	---	
	NI-40x	15-0	0-6	1-6	3-0	4-6	6-6	6-6	---	---	---	---	---	---	---	---	
	NI-60	16-7	1-6	2-6	4-0	5-6	7-6	7-6	---	---	---	---	---	---	---	---	
	NI-70	17-8	2-0	3-6	5-0	6-6	8-0	8-6	---	---	---	---	---	---	---	---	
	NI-80	18-2	2-6	3-6	5-0	6-6	8-6	8-6	---	---	---	---	---	---	---	---	
11 ¹ / ₄	NI-20	14-2	0-6	0-6	0-6	2-0	3-6	4-0	5-6	7-6	---	---	---	---	---	---	
	NI-40x	16-7	0-6	0-6	1-6	3-0	4-6	5-0	6-0	8-0	---	---	---	---	---	---	
	NI-60	18-11	0-6	2-0	3-0	4-6	6-0	6-6	7-6	9-6	---	---	---	---	---	---	
	NI-80	20-9	2-0	3-0	4-6	6-0	7-6	8-0	9-0	11-0	---	---	---	---	---	---	
11 ⁷ / ₈	NI-20	14-2	0-6	0-6	0-6	1-0	3-0	3-0	4-6	6-6	7-6	---	---	---	---	---	
	NI-40	16-7	0-6	0-6	1-6	2-6	4-0	4-6	5-6	7-0	8-0	---	---	---	---	---	
	NI-40x	17-1	0-6	0-6	1-6	2-6	4-0	4-6	5-6	7-0	8-0	---	---	---	---	---	
	NI-60	19-8	0-6	1-6	3-0	4-6	5-6	6-0	7-6	9-0	10-0	---	---	---	---	---	
	NI-70	21-3	1-6	2-6	4-0	5-6	7-0	7-6	8-6	10-0	11-0	---	---	---	---	---	
	NI-80	21-7	1-6	3-0	4-0	5-6	7-0	7-6	8-6	10-6	11-6	---	---	---	---	---	
	NI-90x	22-4	0-6	0-6	0-6	2-6	4-6	5-0	6-6	---	---	---	---	---	---	---	
14	NI-40	18-3	0-6	0-6	0-6	1-0	2-0	2-6	3-6	4-6	5-6	6-0	8-0	9-6	---	---	
	NI-40x	18-10	0-6	0-6	0-6	1-0	2-6	2-6	3-6	5-0	6-0	6-6	8-0	10-0	---	---	
	NI-60	21-7	0-6	0-6	1-6	3-0	4-0	4-6	5-6	7-0	8-0	8-6	11-6	12-0	---	---	
	NI-70	21-9	0-6	0-6	1-6	3-0	4-6	4-6	6-0	8-0	9-0	9-6	12-0	13-6	---	---	
	NI-80	24-6	1-0	2-0	3-6	5-0	6-0	6-6	7-6	9-0	10-0	11-0	12-6	14-0	---	---	
16	NI-40	19-8	0-6	0-6	0-6	0-6	0-6	0-6	1-6	3-0	3-6	4-6	5-6	7-0	7-0	9-0	
	NI-40x	20-3	0-6	0-6	0-6	0-6	0-6	1-0	2-0	3-6	4-0	4-6	6-0	7-0	7-6	9-6	
	NI-60	21-9	0-6	0-6	0-6	0-6	1-6	2-0	3-0	4-6	5-6	6-0	8-0	9-6	10-0	12-0	
	NI-70	21-9	0-6	0-6	0-6	0-6	2-0	2-6	3-6	5-6	6-6	7-0	9-0	10-6	11-0	13-6	
	NI-80	26-3	0-6	1-0	2-0	3-6	4-6	5-0	6-0	7-6	8-6	9-0	10-6	12-0	12-6	14-6	
	NI-90x	28-3	0-6	0-6	0-6	2-0	3-6	4-0	5-0	7-0	8-0	8-6	10-6	11-6	12-0	---	

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

(Continued)

Notes to Table 3A (Continued)

¹Table may be used for I-joist spacing of 24 inches on center or less.

²Hole location distance is measured from inside face of supports to center of hole.

³Distances in this chart are based on uniformly loaded joists supporting a live load of 40 psf and a dead load of 10 psf.

⁴For continuous joists with more than one span, use the longest span to determine hole location in either span.

⁵SAF = Span Adjustment Factor, used as defined below.

OPTIONAL:

Table 3A 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 maximum distance from the centerline of the hole to the face of any support (*D*) as given above may be reduced as follows:

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

D_{reduced} = 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 that shown below:

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
Minimum distance, D (ft-in)	0-6	0-6	1-0	1-0	1-0	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	2-0

L_{actual} = The actual measured span distance between the inside faces of supports (ft).

SAF = Span Adjustment Factor given in Table 3A (ft).

D = The minimum distance from the inside face of any support to center of hole from Table 3A (ft).

If $\frac{L_{actual}}{SAF} \geq 1.0$, use 1.0 in the above calculation for $\frac{L_{actual}}{SAF}$.

TABLE 3B—LOCATION OF CIRCULAR HOLES IN NI JOIST WEBS (18- TO 24-INCH JOIST DEPTHS), SIMPLE OR MULTIPLE SPAN, FOR LIVE LOADS UP TO 40 psf AND DEAD LOADS UP TO 15 psf^{1,2,3,4,5}

JOIST DEPTH (in.)	JOIST SERIES	SAF (ft-in)	MINIMUM DISTANCE FROM INSIDE FACE OF ANY SUPPORT TO CENTER OF HOLE (ft-in)														
			Round Hole Diameter (in.)														
			2	4	6	8	10	12	14	14 ³ / ₄	16	16 ³ / ₄	18	18 ³ / ₄	20	20 ³ / ₄	22
18	NI-60	23-7	0-6	1-0	3-0	5-6	7-6	10-0	15-0	17-0	—	—	—	—	—	—	—
18	NI-80x	28-0	0-6	1-6	3-6	6-6	9-0	12-0	16-6	18-0	—	—	—	—	—	—	—
20	NI-80x	29-8	0-6	1-0	3-6	6-0	8-6	11-0	14-6	16-0	19-0	21-0	—	—	—	—	—
22	NI-80x	30-7	0-6	0-6	3-0	5-0	7-6	10-0	13-0	14-0	16-6	18-6	22-0	24-0	—	—	—
24	NI-80x	30-7	0-6	0-6	2-0	4-0	6-6	9-0	12-0	13-0	15-0	16-6	19-6	21-6	25-0	27-0	—

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

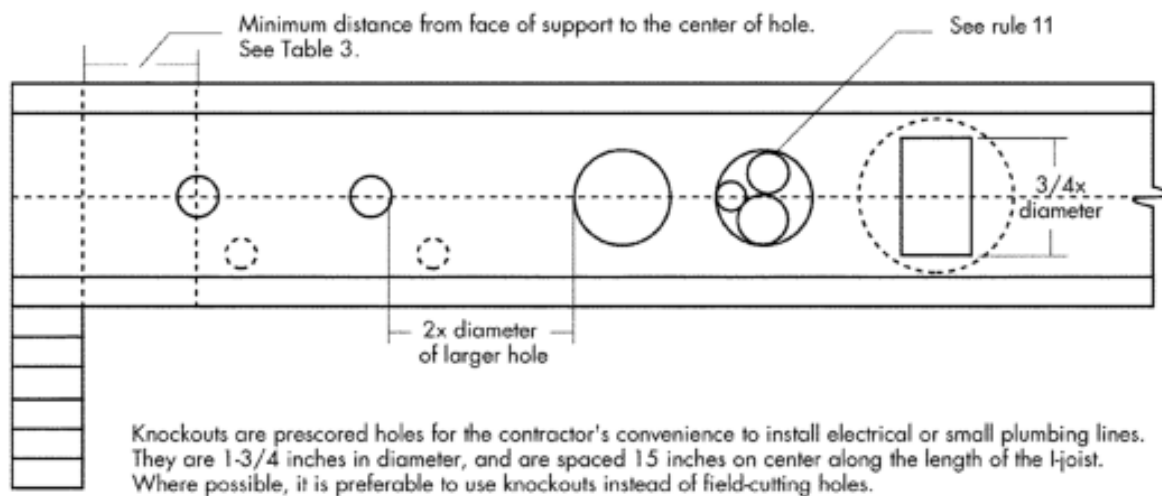
¹Table may be used for I-joist spacing of 24 inches on center or less.

²Hole location distance is measured from inside face of supports to center of hole.

³Distances in this chart are based on uniformly loaded joists supporting a live load of 40 psf and a dead load of 15 psf.

⁴For continuous joists with more than one span, use the longest span to determine hole location in either span.

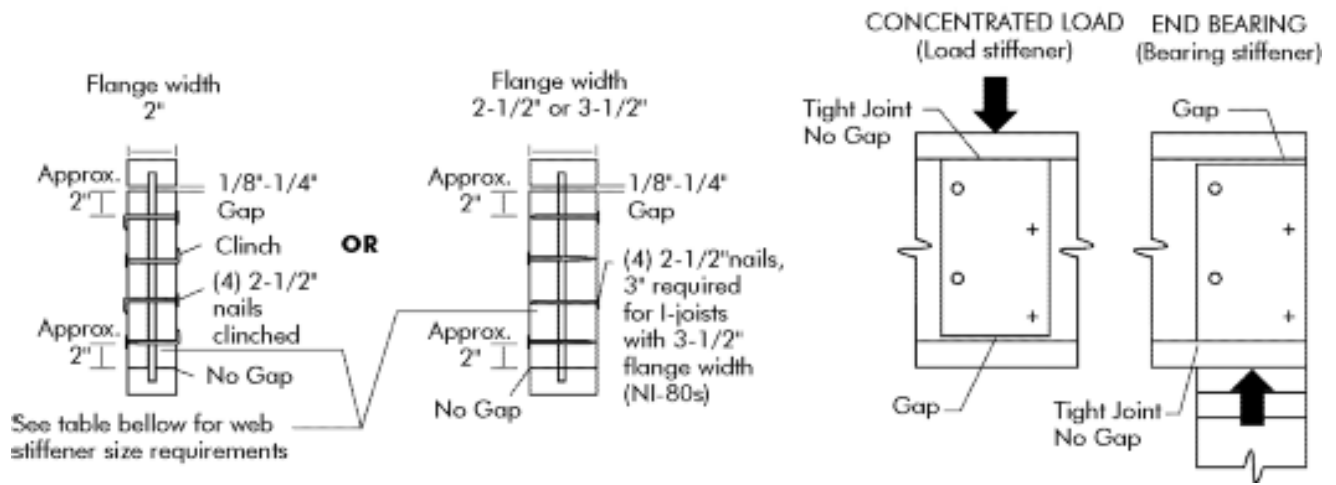
⁵SAF = Span Adjustment Factor.



Rules for cutting holes in NI 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 Tables 3A and 3B.
2. I-joist top and bottom flanges must not be cut, notched, or otherwise modified.
3. The maximum-size hole that can be cut into an I-joist web is equal to the clear distance between the flanges of the I-joist minus 1/4 inch. A minimum of 1/8 inch must always be maintained between the top or bottom of the hole and the adjacent I-joist flange. Whenever possible, field-cut holes should be centered along the depth of the web.
4. The sides of square holes or longest sides of rectangular holes must not exceed three fourths of the diameter of the maximum found hole permitted in that location.
5. Where more than one hole is necessary, the distance between adjacent hole edges must exceed twice the diameter of the largest round hole or twice the sized 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 Tables 3A and 3B.
6. Holes with a diameter of 1 1/2 inch or smaller may be placed anywhere in the web of a cantilevered section of a NI Joist. Holes larger than 1 1/2 inches in diameter may not be cut in cantilevers.
7. Holes with a diameter of 1 1/2 inch or smaller may be placed anywhere in the web provided that it meets the requirements of item number 6 above.
8. For joists with more than one span, use the longest span to determine hole location in either span.
9. All holes must be cut in a workmanlike manner in accordance with the restrictions listed above and as illustrated in Figure 1.
10. Limit three maximum-size holes per span. For the purposes of determining allowable web hole sizes and placement, knockout are not considered holes, and may be utilized anywhere they occur.
11. A group of round holes at approximately the same location is permitted if they meet the requirements for a single round hole circumscribed around them.

FIGURE 1—TYPICAL HOLES



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 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, any where between the cantilever tip and the support.
 - d) At exterior supports in engineered applications where concentrated loads cause exterior reaction loads to exceed 1550 pounds, with the exception of the NI-80x and NI-90x, which require web stiffeners when end reaction values exceed 1850 and 1885 pounds, respectively.
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—NI-SERIES I-JOIST WEB STIFFENER CONSTRUCTION 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 x 2 5/16 minimum width
3 1/2 inches	1 1/2 x 2 5/16 minimum width