CONSTRUCTION DETAILS FOR RESIDENTIAL FLOORS

N-U303 / April 2009

NORDIC ENGINEERED WOOD

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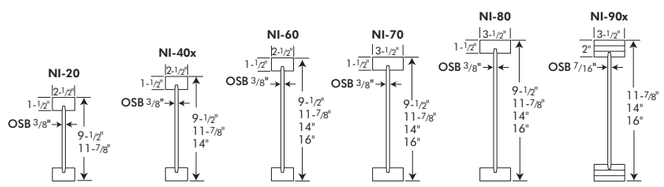


S-P-F No.2	1950f MSR	2100f MSR	1950f MSR	2100f MSR	NPG Lumber
33 pieces per unit	33 pieces per unit	33 pieces per unit	23 pieces per unit	23 pieces per unit	23 pieces per unit

Refer to the *Installation Guide for Residential Floors* for additional information.
ICC-ES EVALUATION REPORT ESR-1742

WEB HOLE SPECIFICATIONS

RULES FOR CUTTING HOLES AND DUCT CHASE OPENINGS:

1. The distance between the inside edge of the support and the centerline of any hole or duct chase opening shall be in compliance with the requirements of Table 1 or 2, respectively.
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 or the maximum depth of a duct chase opening 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 or opening and the adjacent I-joist flange.
5. The sides of square holes or longest sides of rectangular holes should not exceed 3/4 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 or duct chase opening)* and each hole and duct chase opening shall be sized and located in compliance with the requirements of Tables 1 and 2, respectively.
7. A knockout is **not** considered a hole, may be utilized anywhere it occurs, and may be ignored for purposes of calculating minimum distances between holes and/or duct chase openings.
8. 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.
9. A 1-1/2 inch hole or smaller can be placed anywhere in the web provided that it meets the requirements of item 6 above.
10. For continuous joists with more than one span, use the longest span to determine hole location in either span.
11. All holes and duct chase openings shall be cut in a workman-like manner in accordance with the restrictions listed above and as illustrated in Figure 7.
12. Limit three maximum size holes and one duct chase opening per span.
13. A group of round holes at approximately the same location shall be permitted if they meet the requirements for a single round hole circumscribed around them.

TABLE 1

HOLE SIZES AND LOCATIONS

Simple or Multiple Span

Joist Depth	Joist Series	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
9-1/2"	NI-20	0'-6"	1'-0"	2'-6"	3'-6"	5'-6"	6'-0"	---	---	---	---	---	---	---	---	---
	NI-40x	0'-6"	1'-6"	3'-0"	4'-6"	6'-0"	6'-6"	---	---	---	---	---	---	---	---	---
	NI-60	1'-6"	2'-6"	4'-0"	5'-6"	7'-0"	7'-6"	---	---	---	---	---	---	---	---	---
	NI-70	2'-0"	3'-6"	5'-0"	6'-6"	8'-0"	8'-6"	---	---	---	---	---	---	---	---	---
	NI-80	2'-6"	3'-6"	5'-0"	6'-6"	8'-6"	8'-6"	---	---	---	---	---	---	---	---	---
11-7/8"	NI-20	0'-6"	0'-6"	0'-6"	1'-0"	3'-0"	3'-0"	4'-6"	6'-6"	7'-6"	---	---	---	---	---	---
	NI-40x	0'-6"	0'-6"	1'-6"	2'-6"	4'-0"	4'-6"	5'-6"	7'-0"	8'-0"	---	---	---	---	---	---
	NI-60	0'-6"	1'-6"	3'-0"	4'-6"	5'-6"	6'-0"	7'-6"	9'-0"	10'-0"	---	---	---	---	---	---
	NI-70	1'-6"	2'-6"	4'-0"	5'-6"	7'-0"	7'-6"	8'-6"	10'-0"	11'-0"	---	---	---	---	---	---
	NI-80	1'-6"	3'-0"	4'-0"	5'-6"	7'-0"	7'-6"	8'-6"	10'-6"	11'-6"	---	---	---	---	---	---
	NI-90x	0'-6"	0'-6"	0'-6"	2'-6"	4'-6"	5'-0"	6'-6"	---	---	---	---	---	---	---	---
14"	NI-40x	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	0'-6"	0'-6"	1'-6"	3'-0"	4'-0"	4'-6"	5'-6"	7'-0"	8'-0"	8'-6"	10'-6"	12'-0"	---	---	---
	NI-70	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	1'-0"	2'-0"	3'-6"	5'-0"	6'-0"	6'-6"	7'-6"	9'-0"	10'-0"	11'-0"	12'-6"	14'-0"	---	---	---
	NI-90x	0'-6"	0'-6"	0'-6"	2'-0"	4'-0"	4'-0"	5'-6"	7'-6"	8'-6"	9'-0"	---	---	---	---	---
16"	NI-60	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"	14'-0"
	NI-70	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"	15'-6"
	NI-80	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"	16'-0"
	NI-90x	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"	---	---

1. Above table may be used for I-joist spacing of 24 inches on center or less.
2. Hole location distance is measured from inside face of supports to center of hole.
3. For continuous joists with more than one span, use the **longest** span to determine hole location in either span.
4. Distances are based on uniformly loaded floor joists that meet the span requirements for a design live load of 40 psf and dead load of 10 psf, and a live load deflection limit of L/480. For other applications, contact your local distributor.
5. The above table is based on the I-joists being used at their maximum spans. The minimum distance as given above may be reduced for shorter spans; contact your local distributor.

TABLE 2

DUCT CHASE OPENING SIZES AND LOCATIONS

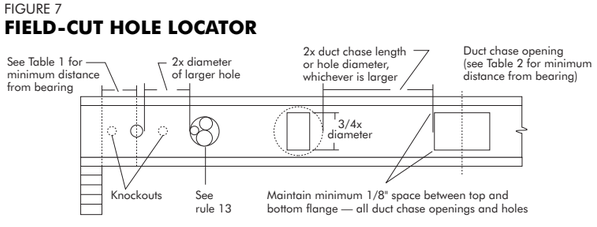
Simple Span Only

Joist Depth	Joist Series	Min. Distance From Inside Face of Any Supports to Center of Opening (ft - in.) Duct Chase Length (in.) 8	10	12	14	16	18	20	22	24
9-1/2"	NI-20	4'-6"	5'-0"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"
	NI-40x	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"
	NI-60	5'-6"	6'-0"	6'-6"	7'-0"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"
	NI-70	5'-6"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	7'-6"	8'-0"	8'-6"
	NI-80	5'-6"	6'-0"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"
11-7/8"	NI-20	6'-0"	6'-6"	7'-0"	7'-6"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"
	NI-40x	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"
	NI-60	7'-6"	8'-0"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-6"
	NI-70	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-0"	10'-6"
	NI-80	7'-6"	8'-0"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"
	NI-90x	8'-0"	8'-6"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"
14"	NI-40x	8'-0"	8'-6"	9'-0"	9'-6"	10'-6"	11'-0"	11'-6"	12'-6"	---
	NI-60	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	---
	NI-70	9'-0"	9'-6"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"
	NI-80	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"
	NI-90x	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"
16"	NI-60	10'-6"	11'-0"	11'-0"	12'-0"	12'-6"	13'-0"	13'-6"	14'-6"	---
	NI-70	10'-6"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-6"
	NI-80	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"
	NI-90x	11'-6"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	15'-6"

1. Above table may be used for I-joist spacing of 24 inches on center or less.
2. Duct chase opening location distance is measured from inside face of supports to center of opening.
3. The above table is based on simple-span joists only. For other applications, contact your local distributor.
4. Distances are based on uniformly loaded floor joists that meet the span requirements for a design live load of 40 psf and dead load of 10 psf, and a live load deflection limit of L/480.
5. The above table is based on the I-joists being used at their maximum spans. The minimum distance as given above may be reduced for shorter spans; contact your local distributor.

FIGURE 7

FIELD-CUT HOLE LOCATOR



Knockouts are prescored holes provided for the contractor's convenience to install electrical or small plumbing lines. They are 1-1/2 inches in diameter, and are spaced 15 inches on center along the length of the I-joist. Where possible, it is preferable to use knockouts instead of field-cut holes.

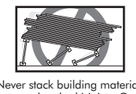
Never drill, cut or notch the flange, or over-cut the web.

Holes in webs should be cut with a sharp saw.

For rectangular holes, avoid over-cutting the corners, as this can cause unnecessary stress concentrations. Slightly rounding the corners is recommended. Starting the rectangular hole by drilling a 1-inch diameter hole in each of the four corners and then making the cuts between the holes is another good method to minimize damage to the I-joist.

SAFETY AND CONSTRUCTION PRECAUTIONS

Do not walk on I-joists until fully fastened and braced, or serious injuries can result.



Never stack building materials over unsheathed I-joists. Once sheathed, do not over-stress I-joists with concentrated loads from building materials.

WARNING: I-joists are unstable until completely installed with panels fully fastened to the top flanges.

AVOID ACCIDENTS BY FOLLOWING THESE IMPORTANT GUIDELINES:

1. Brace and nail each I-joist as it is installed, using hangers, blocking panels, rim board, and/or cross-bridging at joist ends.
2. When the building is completed, the floor sheathing will provide lateral support for the top flanges of the I-joists. Until this sheathing is applied, temporary bracing, often called struts, or temporary sheathing must be applied to prevent I-joist rollover or buckling.
   - Temporary bracing or struts must be 1x4 inch minimum, at least 8 feet long and spaced no more than 8 feet on center, and must be secured with a minimum of two 8d nails fastened to the top surface of each I-joist. Nail the bracing to a lateral restraint at the end of each bay. Lap ends of adjoining bracing over at least two I-joists.
   - Or, sheathing (temporary or permanent) can be nailed to the top flange of the first 4 feet of I-joists at the end of the bay.
3. For cantilevered I-joists, brace top and bottom flanges, and brace ends with closure panels, rim board, or cross-bridging.
4. Install and nail permanent sheathing to each I-joist before placing loads on the floor system. Then, stack building materials over beams or walls only.
5. Never install a damaged I-joist.

Improper storage or installation, failure to follow applicable building codes, failure to follow span ratings for Nordic I-joists, failure to use allowable hole sizes and locations, or failure to use web stiffeners when required can result in serious accidents. Follow these installation guidelines carefully.

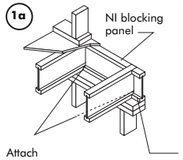
CHANTIERS CHIBOUGAMAU

PRODUCT WARRANTY

Chantiers Chibougamau guarantees that, in accordance with our specifications, Nordic products are free from manufacturing defects in material and workmanship.

Furthermore, Chantiers Chibougamau warrants that our products, when utilized in accordance with our handling and installation instructions, will meet or exceed our specifications for the lifetime of the structure.

1a

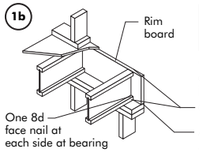


Blocking Panel or Rim Joist	Uniform Vertical Load Transfer Capacity* (plf)
NI Joists	2,000

*The uniform vertical load capacity is limited to a joist depth of 16 inches or less and is based on the normal (10-yr) load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see detail 1d.

8d nails at 6" o.c. to top plate (when used for lateral shear transfer, nail to bearing plate with same nailing as required for decking)

1b



Blocking Panel or Rim Joist	Uniform Vertical Load Transfer Capacity* (plf)
1-1/8" Rim Board	4,850

*The uniform vertical load capacity is limited to a rim board depth of 16 inches or less and is based on the normal (10-yr) load duration. It shall not be used in the design of a bending member, such as joist, header, or rafter. For concentrated vertical load transfer capacity, see detail 1d.

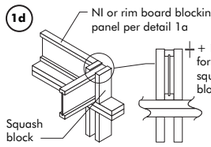
One 8d nail at top and bottom flange

Attach rim board to top plate using 8d common or box toe-nails at 6" o.c.

To avoid splitting flange, start nails at least 1-1/2" from end of I-joist. Nails may be driven at an angle to avoid splitting of bearing plate.

Minimum bearing length shall be 1-3/4" for the end bearings, and 3-1/2" for the intermediate bearings when applicable.

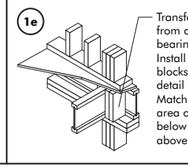
1d



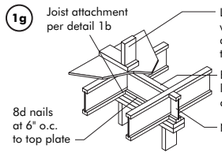
Pair of Squash Blocks	Vertical Load Transfert Capacity per Pair of Squash Blocks (lbs) 3-1/2" wide	5-1/2" wide
2x Lumber	4,000	7,000
1-1/8" Rim Board	3,000	3,500

Provide lateral bracing per detail 1a, or 1b

1e



1g



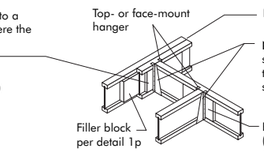
1h

Backer block (use if hanger load exceeds 250 lbs). Before installing a backer block to a double I-joist, drive three additional 10d nails through the webs and filler block where the backer block will fit. Clinch. Install backer tight to top flange. Use twelve 10d nails, clinched when possible. Maximum capacity for hanger for this detail = 1,280 lbs.

BACKER BLOCKS (Blocks must be long enough to permit required nailing without splitting)

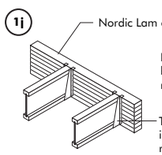
Flange Width	Material Thickness Required*	Minimum Depth**
2-1/2"	1"	5-1/2"
3-1/2"	1-1/2"	7-1/4"

* Minimum grade for backer block material shall be Utility grade S-P-F (south) or better for solid sawn lumber and Rated Sheathing grade for wood structural panels.
** For face-mount hangers use net joist depth minus 3-1/4" for joists with 1-1/2" thick flanges. For 2" thick flanges use net depth minus 4-1/4".



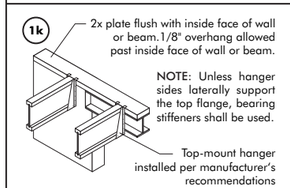
For hanger capacity see hanger manufacturer's recommendations. Verify double I-joist capacity to support concentrated loads.

1j

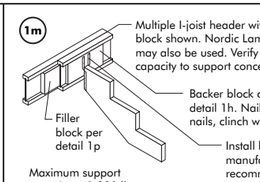


NOTE: Unless hanger sides laterally support the top flange, bearing stiffeners shall be used.

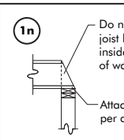
1k



1m

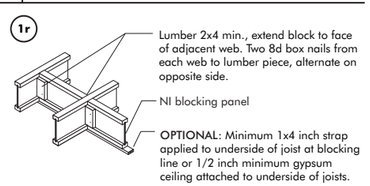


1n

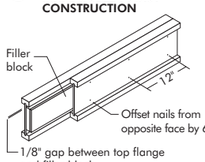


NOTE: Blocking required at bearing for lateral support, not shown for clarity.

1r



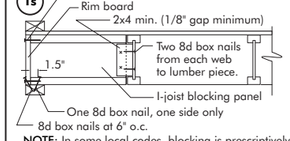
1p **FILLER BLOCK REQUIREMENTS FOR DOUBLE I-JOIST CONSTRUCTION**



NOTES:
1. Support back of I-joist web during nailing to prevent damage to web/flange connection.
2. Leave a 1/8-inch gap between top of filler block and bottom of top I-joist flange.
3. Filler block is required between joists for full length of span.
4. Nail joists together with two rows of 10d nails at 12 inches o.c. (clinched when possible) on each side of the double I-joist. Total of four nails per foot required. If nails can be clinched, only two nails per foot are required.
5. The maximum load that may be applied to one side of the double joist using this detail is 620 lbf/ft. Verify double I-joist capacity.

Flange Size	Net Depth	Filler Block Size
2-1/2" x 1-1/2"	9-1/2"	2-1/8" x 6"
	11-7/8"	2-1/8" x 8"
	14"	2-1/8" x 10"
	16"	2-1/8" x 12"
3-1/2" x 1-1/2"	9-1/2"	3" x 6"
	11-7/8"	3" x 8"
	14"	3" x 10"
	16"	3" x 12"
3-1/2" x 2"	11-7/8"	3" x 7"
	14"	3" x 9"
	16"	3" x 11"

1s



NOTE: In some local codes, blocking is prescriptively required in the first joist space (or first and second joist space) next to the starter joist. Where required, see local code requirements for spacing of the blocking.

All nails shown in the details are assumed to be common nails unless otherwise noted. 10d box nails (0.128 x 3 in.) may be sustituted for 8d common (0.131 x 2-1/2 in.) shown in details. Individual components not shown to scale for clarity.

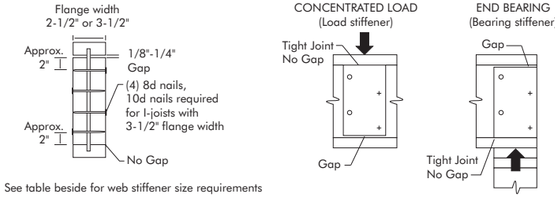
WEB STIFFENERS

RECOMMENDATIONS:

- A ***bearing stiffener*** is required in all engineered applications with design end reactions greater than 1,550 lbs, with the exception of NI-90x, which requires bearing stiffeners when end reaction values exceed 1,885 lbs. The gap between the stiffener and the flange is at the top.
- A ***bearing stiffener*** is required when the I-joist is supported in a hanger and the sides of the hanger do not extend up to, and support, the top flange. The gap between the stiffener and flange is at the top
- A ***load stiffener*** is required at locations where a concentrated load greater than 1,500 lbs is applied to the top flange between supports, or in the case of a cantilever, anywhere between the cantilever tip and the support. These values are for normal duration of load, and may be adjusted for other load durations as permitted by the code. The gap between the stiffener and the flange is at the bottom.

FIGURE 2

WEB STIFFENER INSTALLATION DETAILS



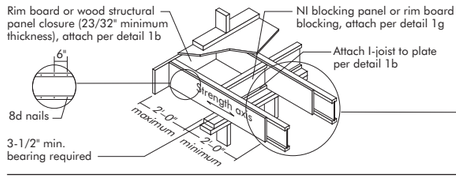
See table beside for web stiffener size requirements

STIFFENER SIZE REQUIREMENTS

Flange Width	Web Stiffener Size Each Side of Web
2-1/2"	1" x 2-5/16" minimum width
3-1/2"	1-1/2" x 2-5/16" minimum width

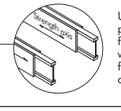
CANTILEVER DETAILS FOR VERTICAL BUILDING OFFSET

4a **Method 1 — SHEATHING REINFORCEMENT ONE SIDE**



Method 2 — SHEATHING REINFORCEMENT TWO SIDES

Use same installation as Method 1 but reinforce both sides of I-joist with sheathing.



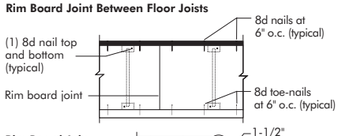
Use nailing pattern shown for Method 1 with opposite face nailing offset by 3"

NOTE: APA RATED SHEATHING 48/24 (minimum thickness 23/32") required on sides of joist. Depth shall match the full height of the joist. Nail with 8d nails at 6" o.c., top and bottom flange. Install with face grain horizontal. Attach I-joist to plate at all supports per detail 1b. Verify reinforced I-joist capacity.

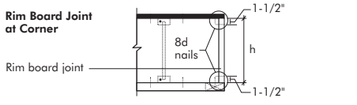
RIM BOARD INSTALLATION DETAILS

8a **ATTACHMENT DETAILS WHERE RIM BOARDS ABUT**

Rim Board Joint Between Floor Joists



Rim Board Joint at Corner



8b **TOE-NAIL CONNECTION AT RIM BOARD**