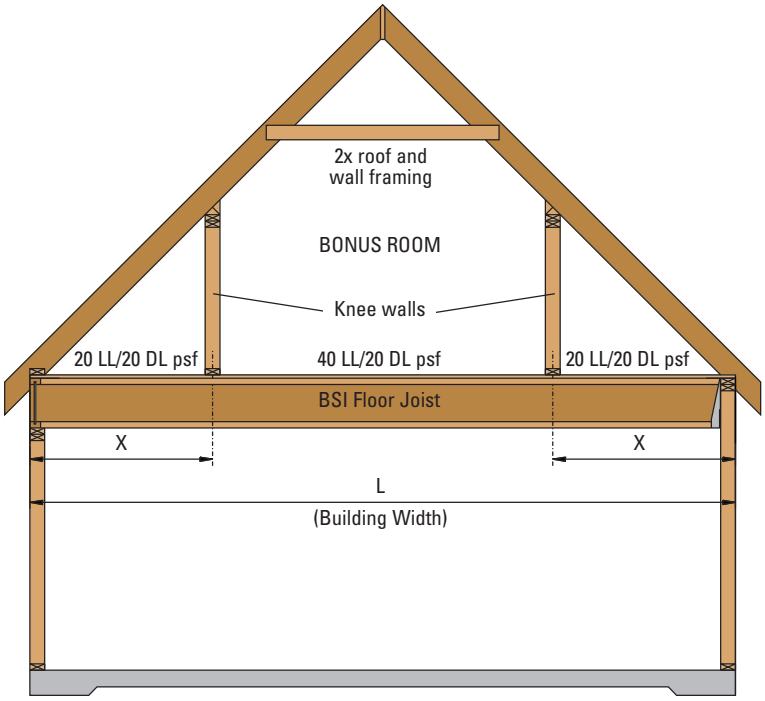
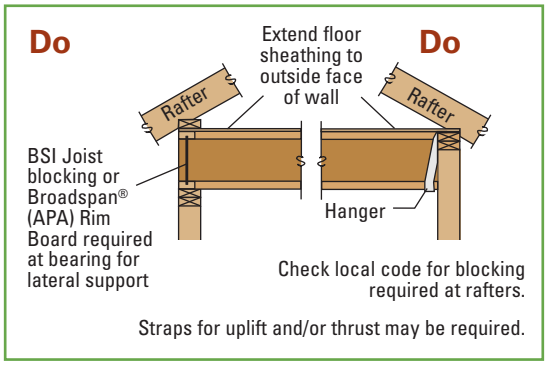
Bonus Room Floor Joist Selection Guide

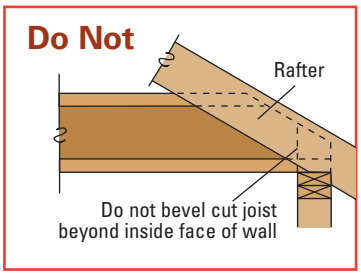
L (Building Width)	X (Kneewall Location)	BSI Joists (Depth–Series)[1] Minimum Size Meeting Requirements				BSI S Series Joists (Depth–Series)[1] Minimum Size Meeting Requirements			
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
20′	4′	11⅞"– 400	14"– 400	16"– 400	14"– 700[2]	11⅞"– 40S	16"– 40S	14"– 60S	14"– 80S[2]
	5′	11⅞"– 400	14"– 400	16"– 400	14"– 700[2]	11⅞"– 40S	16"– 40S	14"– 60S	14"– 80S
	6′	11⅞"– 400	14"– 400	16"– 400	14"– 700	11⅞"– 40S	16"– 40S	14"– 60S	14"– 80S
22′	4′	14"– 400	16"– 400	14"– 700	16"– 700[2]	14"– 40S	14"– 60S	16"– 60S	16"– 80S[2]
	5′	14"– 400	16"– 400	14"– 700	16"– 700[2]	14"– 40S	14"– 60S	16"– 60S	16"– 80S[2]
	6′	14"– 400	16"– 400	14"– 700	16"– 700[2]	14"– 40S	14"– 60S	16"– 60S	16"– 80S[2]
24′	4′	14"– 400	14"– 700[2]	16"– 700[2]	16"– 900[2]	16"– 40S	16"– 60S	14"– 80S[2]	DBL 16"– 40S
	5′	14"– 400	16"– 700	16"– 700	16"– 900	14"– 60S	16"– 60S	16"– 80S	DBL 14"– 60S
	6′	16"– 400	16"– 700	16"– 700	16"– 900	14"– 60S	16"– 60S	16"– 80S	DBL 14"– 60S
	7′	16"– 400	16"– 700	16"– 700	16"– 900	14"– 60S	16"– 60S	16"– 80S	DBL 14"– 60S
26′	4′	16"– 400	16"– 700	16"– 900	16"– 900[3]	16"– 60S	16"– 80S	16"– 80S[2,4]	DBL 16"– 60S
	5′	16"– 400	16"– 700	16"– 900	16"– 900[3]	16"– 60S	16"– 80S	16"– 80S[2]	DBL 16"– 60S
	6′	16"– 700	16"– 700	16"– 900	DBL 16"– 700	16"– 60S	16"– 80S	16"– 80S[2]	DBL 16"– 60S
	7′	16"– 700	16"– 700	16"– 900	DBL 16"– 700	16"– 60S	16"– 80S	16"– 80S	DBL 16"– 60S
28′	4′	16"– 700	16"– 900	16"– 900	DBL 16"– 700	16"– 60S	16"– 80S	DBL 16"– 60S	DBL 16"– 60S
	5′	16"– 700	16"– 900	16"– 900[2]	DBL 16"– 700	16"– 60S	16"– 80S	DBL 16"– 60S	DBL 16"– 60S
	6′	16"– 700	16"– 900	DBL 16"– 400	DBL 16"– 700	16"– 80S	DBL 16"– 40S	DBL 16"– 60S	DBL 16"– 80S
	7′	16"– 700	16"– 900	DBL 16"– 400	DBL 16"– 700	16"– 80S	DBL 16"– 40S	DBL 16"– 60S	DBL 16"– 80S

NOTES

1. Double joist (2-ply) is denoted by "DBL". Both joists must be glued and nailed as required for floor sheathing. No filler blocking required when top-loaded only.
2. A 2½" minimum bearing length must be provided by support wall or hanger seat.
3. A 3" minimum bearing length must be provided by support wall or hanger seat.
4. To be used in this application, the joist requires bearing stiffeners at both ends per BSI Joist Bearing Stiffeners on page 18.







Design Conditions:

1. Glued and nailed floor sheathing.
2. Deflection limits: L/240 total load, L/480 live load, unless noted otherwise.
3. Roof loads of 30 PSF live load at 115% (snow load).
4. Roof dead load of 12 PSF (asphalt shingles).
5. Roof rafter slope between 8/12 and 12/12.
6. Kneewall weight of 40 PLF.
7. Attic storage load of 20 PSF live load (outside the kneewalls).
8. Floor live load of 40 PSF (between the kneewalls).
9. Floor dead load of 20 PSF. Attic dead load of 20 psf to accommodate increased R-value insulation options.
10. Straight gable roof framing. No hip framing is permitted.
11. For other conditions, including holes, use software.

Fire-Rated Assemblies

Building codes for apartments and multi-family homes commonly require floor, ceiling or even roof framing assemblies that have a fire-resistant rating in accordance with standard ASTM fire tests. Wood I-joists along with conventional lumber and other framing materials provide the structural support, and the fire rated assemblies provide the fire-resistant rating. For these fire-rated assemblies, BSI joists are acceptable for use as noted in the table below. Several widely used "generic" assemblies are provided in "Design for Code Acceptance 3" (DCA 3), an American Wood Council (AWC) publication. Most of these details have also been adopted by the International Building Code (IBC) as contained in Table 720.1(3) of the 2006 IBC. Several of the details and similar assemblies are provided in the Gypsum Association's Fire Resistance Design Manual (GA-600-2006).

Additional "generic" assemblies appear in various APA publications and in the APA ICC-ES code report ESR-1405. Instead of being specific to a single manufacturer, "generic" assemblies are generally dependent on the product dimensions for wood I-joists, and the product grades for gypsum board. All BSI series in this guide can be used in the following common assembly (WIJ-1.6 from DCA 3), used for illustration. WIJ-1.4 has been omitted due to its relative difficulty for installation.

Fire-Rated Assemblies Table

Duration	2006 IBC Table 720.1(3)	AWC DCA 3	APA ICC-ES Report ESR-1405	BSI Joists in this guide that meet the requirements
1 Hr.	Item 21-1.1	-	Assembly 2	All BSI and BSI S Series
1 Hr.	Item 23-1.1	WIJ-1.3	-	All BSI and BSI S Series
1 Hr.	Item 25-1.1	WIJ-1.1	-	BSI 900, 80S
1 Hr.	Item 26-1.1	WIJ-1.2	-	16 BSI 900
1 Hr.	Item 27-1.1	WIJ-1.5	-	BSI 700, 900, 40S, 60S, 80S
1 Hr.	Item 28-1.1	WIJ-1.6	-	All BSI and BSI S Series
1 Hr.	-	WIJ-1.7	-	BSI 700, 900, 40S, 60S, 80S
1 Hr.	-	-	Assembly 1	BSI 900, 40S, 60S, 80S
1 Hr.	-	-	Assembly 3	All BSI and BSI S Series
2 Hr.	Item 29-1.1	WIJ-2.1	-	BSI 700, 900, 40S, 60S, 80S

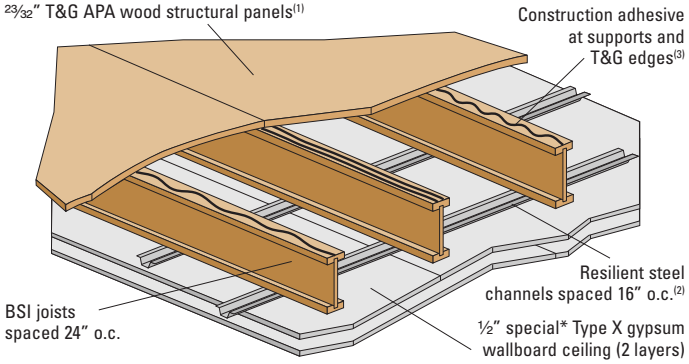
For additional resources, please see the following:

AWC: DCA 3 (www.awc.org/Publications/)

APA: The Engineered Wood Association (www.apawood.org/publications)
ICC ES Report ESR-1405
Form No. W305 for I-joists
Form No. D350 for Rim Board

GA: Gypsum Association (www.gypsum.org)

IBC: International Building Code (www.iccsafe.org)



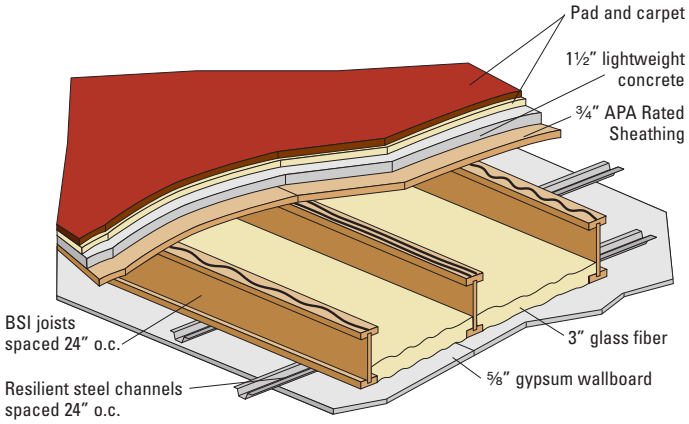
1. Paragraph 13 of the UL Fire Resistance Directory indicates wood structural panels include all-veneer plywood, composite panels, and mat-formed (OSB) panels bearing a PS 1 or PS 2 standard label, or labeled to meet APA Standard PRP-108 or PFS Standard PRP-133. Substitution is based on equivalent panel thickness.
2. For improved acoustical performance, gypsum wallboard is fastened to steel resilient furring channels in some assemblies.
3. Construction adhesive must conform to APA Specification AFG-01, or ASTM D 3498.

*Although most residential structures (detached one- and two-family dwellings) do not require fire-resistance-rated assemblies, the inclusion of a protective membrane such as gypsum board can improve fire performance. Passing a fire test in a controlled laboratory setting and referring to an assembly as having a one-hour, two-hour, or any other fire resistance or protection rating does not mean that either the particular assembly/system will necessarily provide one-hour fire resistance, two-hour fire resistance, or any other specified fire resistance or protection in an actual fire. In the event of an actual fire, you should immediately take any and all actions necessary for your safety and the safety of others without regard for any fire rating of any assembly/system. For additional information please visit www.gp.com/safetyinfo.

Noise-Rated Assemblies

Building codes may also require that framing assemblies meet certain noise ratings. The assembly is typically rated for both noise transmission types—airborne (sound transmission class or STC number) and impact (impact insulation class or IIC number). The higher the number, the better the noise control. For reference, an STC rating of 25 would allow normal speech to be heard quite clearly, while an STC of 50 would limit loud speech to an inaudible range.

All BSI joist series in this guide can be used in the noise rated assembly shown here. Many more noise rated assemblies are in the AWC, APA, and Gypsum Association references listed in the section above. Further general information on noise rated assemblies is given in APA Form No. W460 (www.apawood.org/publications).



Test Sponsor and Number[1]	Finish Floor	Deck	Gypsum Wallboard Ceiling	Insulation	STC Rating	IIC Rating	Weight (lbs./sq. ft.)
G&H USDA 11 ST	Vinyl or Tile	1½" of 100-pcf cellular concrete over ¾" APA Rated Sheathing subfloor on I-joists at 24" o.c.	⅝" screwed to resilient metal channels	3" glass fiber	58	50	21.0
G&H USDA 11x ST	Carpet & Pad				58	77	
	None			None	57	None	20.7

1. USDA Forest Service Wood Construction Research (Seattle, WA); acoustical tests by Geiger & Hamme, Inc. (Ann Arbor, MI)

Broadspan® Rim Boards

A rim board is the member that fills the space between the sill plate and bottom plate of a wall or, in second floor construction, between the top plate and bottom plate of two wall sections. The rim board must match the depth of the framing members between floors or between the floor and foundation to function properly. In addition to supporting the wall loads, the rim board ties the floor joists together. It is an integral component in an engineered wood system because it transfers both lateral and vertical bearing forces.

While lumber has been the traditional product used for rim boards, it is not compatible with wood I-joists used in floor construction. With the increasing use of wood I-joists, a demand for compatible engineered wood rim boards has resulted.

Engineered wood rim boards can be manufactured using plywood, oriented strand board (OSB), glued laminated timber (glulam), or laminated veneer lumber (LVL). These rim boards have less shrinkage than lumber and match the depth of wood I-joists and other engineered wood framing products. A lumber rim board can also have a greater tendency toward shape "memory", moving back towards its original shape in the log from which it was cut.

Approved Applications

Broadspan® Rim Board has been tested and approved as a rim board and starter joist by APA-EWS and meets all requirements of ICC-ES acceptance criteria AC-124, "Acceptance Criteria for Wood-Based Rim Board Products". Broadspan Rim Board can also be used as a short span, lightly loaded header (over windows, doors, and foundation vents) and to trim out staircase openings. The maximum header span is 4 feet. Broadspan Rim Board is not recommended as a structural joist, rafter, or ledger. For those applications or for longer spans, use Broadspan I-joist and LVL headers. Broadspan LVL may be substituted for Broadspan Rim Board in all rim board and rim joist applications shown in this User's Guide.

Capacities[a] for Rim Board Applications

Grade	Meets or Exceeds	t[b] (in.)	H[c] (lbs/ft)	V[d] (lbs/ft)		Z[e] (lbs)	P[f] (lbs)
			Depth (d) Limitation (in.)				
			d ≤ 24	d ≤16	16 < d ≤ 24	d ≤ 24	d ≤ 24
Broadspan Rim Board	APA Rim Board	1	180	3300	1650	300	3500
Broadspan Rim Board Plus	APA Rim Board Plus	1⅛	200	4850	3200	350	3500

NOTES

a. The design values apply only to rim applications and must not be used in the design of headers or other bending members. All values except H are for normal duration of load. V and P cannot be increased for duration of load.

b. t = target thickness for grades listed

c. H = horizontal (shear) load transfer capacity (160% load duration) based on attachment per this guide

d. V = bearing (vertical) load capacity which SHALL not be increased for duration of load

e. Z = lateral resistance of a ½" diameter lag screw or through bolt

f. P = concentrated load capacity which SHALL not be increased for duration of load (based on 4½" bearing length); the maximum concentrated load acting on any area of the floor sheathing above the rim board. V and P must simultaneously be satisfied. See Application Note 4 below for more information.

Standard Sizes

Referenced dimensions are nominal and are used for design purposes.

Dimensions	Standard Sizes[a]
Thickness (inches)	1, 1⅛
Depth (inches)	9¼, 9½, 11¼, 11⅞, 14, 16
Length (feet)	12

NOTES

a. Check with Georgia-Pacific for availability of sizes.

Allowable Edgewise Bending Properties[a]

F_b[b] (psi)	E[c] (psi)	F_v[d] (psi)	$F_{c\perp}$[e] (psi)
600	550,000	270	550

NOTES

a. Table values are based on a maximum span of 4 feet (use Broadspan I-joist or LVL headers for longer spans) and 100% duration of load. E and $F_{c\perp}$ shall not be increased for duration of load.

b. Allowable bending stress; volume effect adjustment is included in the value

c. Allowable apparent modulus of elasticity

d. Allowable shear stress

e. Allowable compressive stress perpendicular to grain

Application Notes

1. Rim board spanning openings – allowed to a maximum span of 4 feet. See Allowable Uniform Load for Broadspan Rim Board Headers on page 32.
2. Rim board used as fire blocking panels – The minimum thickness of 1" for rim board exceeds the minimum requirement of 23/32" published in the model building codes as long as the joints are backed by another rim board or a 23/32" structural-use panel. See APA Form No. D350, *APA Rim Board in Fire Rated Assemblies.*
3. Rim board used in applications where a high lateral load transfer capacity is required – When the applied lateral loads exceed the published horizontal load capacities of rim board, add a commercially available specialty connector made by connector manufacturers between the rim board and framing or sole plate. This type of connector is installed using face nailing into the rim board and has a typical lateral load capacity of 400 to 500 lbs per connector.
4. Rim Board subjected to a combination of uniform and concentrated vertical loads – First, the applied concentrated load shall not exceed the concentrated load capacity (P) of the rim board, based on a minimum 4½" bearing length over the floor sheathing attached to the top of the rim board. Second, the applied concentrated load shall be calculated as an equivalent uniform load based on the applied loading length increased by a 45° load distribution through decking and plate on both sides of the concentrated load, as applicable. The equivalent uniform load shall be added to the applied uniform load to determine the total applied uniform load, which shall not exceed the bearing (vertical) load capacity (V) of the rim board. If the total applied uniform load exceeds the bearing load capacity (V), use appropriate squash blocks, double rim boards, or a higher grade of rim board to carry the concentrated vertical load.

Example: A mechanical device distributes a weight of 3000 lbs for a distance of 12" along the top of a 1" x 16" Broadspan Rim Board through 23/32" floor sheathing. In addition to the mechanical device the rim board carries a uniform load of 2000 lbs/ft.

Check:

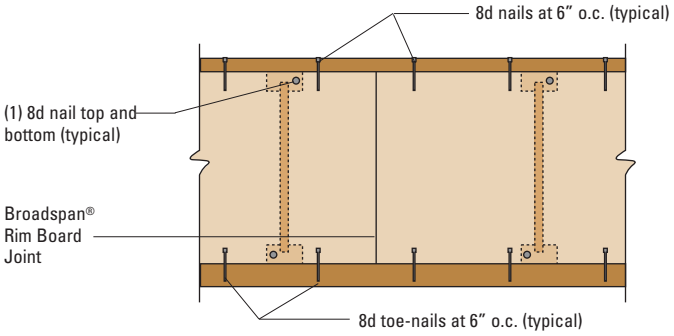
(a) Concentrated vertical load, P = 3000 lbs < 3500 lbs => OK

*(b) Equivalent uniform bearing load, V= 3000/ [(12 + 2 * 23/32)/12] = 2680 lbs/ft. Total equivalent uniform bearing load = 2680 + 2000 = 4680 lbs/ft > 3300 lbs/ft => **NO GOOD** – So use 1⅛" Broadspan Rim Board Plus (4850 lbs/ft cap.), or double the 1" rim board or add squash blocks under the concentrated load area.*

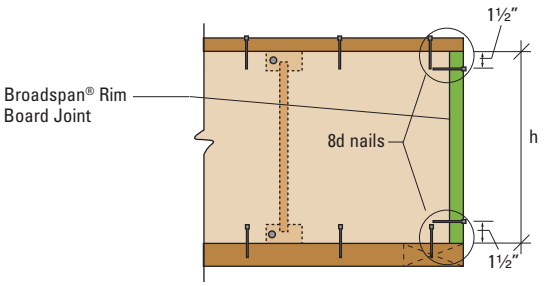
Rim Board Connection Requirements

Figure 1

ATTACHMENT DETAILS WHERE RIM BOARDS ABUT



Rim Board Joint Between Floor Joists or When Used as Starter Joist

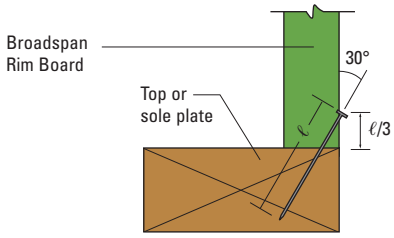


Rim Board Joint at Corner

1. Floor sheathing to rim board (see Figure 1) – Use 8d nails (box or common) at 6" o.c. CAUTION: The horizontal load capacity is not necessarily increased with a decreased nail spacing. Under no circumstances should the nail spacing be less than 3". The 16d (box or common) nails used to connect the bottom plate of a wall to the rim board through the sheathing do not reduce the horizontal load capacity of the rim board provided that the 8d nail spacing (sheathing-rim board) is 6" o.c. and the 16d nail spacing (bottom plate-sheathing-rim board) is in accordance with the prescriptive requirements of the applicable code.
2. Rim board to I-joist (see Figure 1) – Use two 8d nails (box or common), one each into the top and bottom flanges. This is typical for rim board having a thickness up to 1⅛". A larger nail size may be required for a given I-joist or for thicker rim board products.
3. Rim board to sill plate (see Figure 2) – Toe-nail using 8d (box or common) at 6" o.c.

Figure 2

TOE-NAIL CONNECTION AT RIM BOARD



4. Attachment of 2x lumber ledgers to rim board (see Figure 3) – Fasteners must be compatible with the code criteria for the type of preservative treatment. Use ½" diameter through-bolts with washers and nuts, ½" diameter lag screws with tip extending a minimum of ½" beyond rim board, or structural screws. For each bolt and/or lag screw, use a design value of 300 lbs into 1" thick rim and 350 lbs into 1⅛" thick rim. CAUTION: The lag screw should be inserted in a lead hole by turning with a wrench, not by driving with a hammer. Over-torquing can significantly reduce the lateral resistance of the lag screw and should therefore be avoided. See the 2005 National Design Specification for Wood Construction (NDS) published by the American Forest & Paper Association for the appropriate size of clearance and lead holes.
5. Lateral resistance of nails applied to the faces of rim board – Calculate the lateral nail resistance based on the procedures given in the 2005 NDS and the following guidelines:

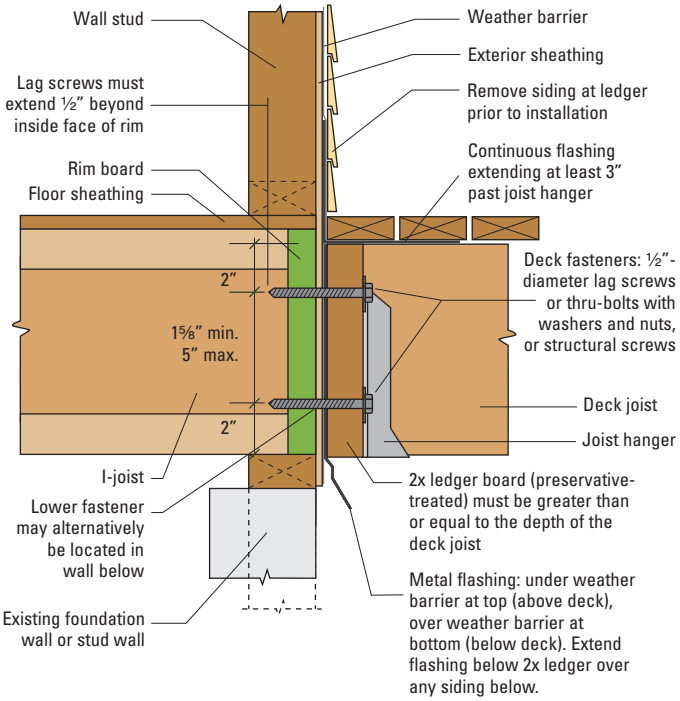
If the rim board is:

(a) Broadspan Rim Board - use an equivalent specific gravity, SG = 0.50.

(b) APA Rim Board with fastener information unavailable - use an equivalent specific gravity, SG = 0.42.

Figure 3

2X LEDGER TO RIM BOARD ATTACHMENT DETAIL

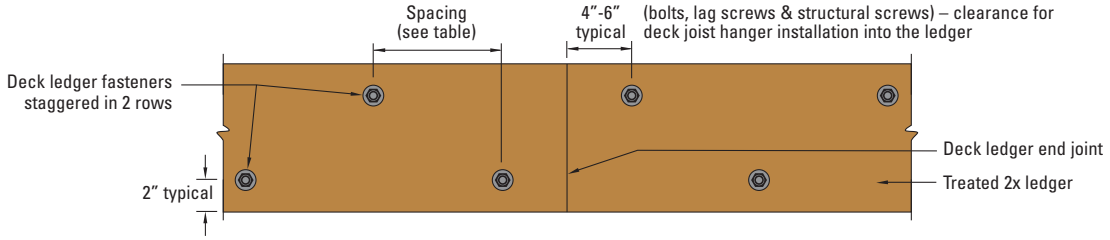


Fill holes and seal flashing with high quality caulk.

Rim Board Connection Requirements (continued)

Figure 4

FASTENER SPACING FOR DECK LEDGER



Allowable Deck Ledger Fastener Spacing

(Based on APA Rated Rim Boards and 15/32" maximum sheathing thickness)[a,c]

Fastener	Broadspan and APA Rim Boards	Joist Span						
		6'	8'	10'	12'	14'	16'	18'
		On-Center Spacing of Fasteners[b]						
Through Bolts and Lag Screws	1⅛" or thicker	28	21	16	14	12	10	9
	1"	24	18	14	12	10	9	8
Structural Screws	Refer to the Manufacturer's Specifications							

Fastener information provided in APA Form No. W345H – APA Performance Rated Rim Boards®, and AF&PA Design for Code Acceptance 6 (DCA 6) - Prescriptive Residential Wood Deck Construction Guide. Refer here for additional deck design information.

NOTES

a. See Figure 3 for attachment cross-section. Ledger shall be spruce-pine-fir or other wood species with a specific gravity of 0.42 or greater.

b. ½" diameter lag screws, through bolts, or structural screws shall be staggered in accordance with Figure 4.

c. Fasteners, hangers, or connectors in contact with preservative and/or fire-retardant treated framing must be compatible with the code criteria and treatment type. Lag screws, through bolts and washers must be hot-dip galvanized, or stainless steel. Refer to structural screw manufacturer's literature for appropriate screw material and/or coating options. (Reference SDS structural screws produced by Simpson Strong-Tie Company, Inc., WS structural screws produced by USP Structural Connectors®, and TrussLok™ structural screws produced by FastenMaster-OMG, Inc.)

Allowable Uniform Load for Broadspan Rim Board Headers (PLF)

	1" Broadspan Rim Board											
	1-Ply (1" width)						2-Ply (2" width) *can only be used as 2-ply minimum*					
	9½"			11⅞"			14"			16"		
Clear Span	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)
1'-6"	1501	1727	1877	2347	2699	2934	6525	6600	6600	6600	6600	6600
2'-0"	960	1104	1200	1501	1726	1877	4173	4800	5218	5280	5280	5280
2'-6"	666	766	833	1041	1198	1302	2895	3331	3621	3783	4352	4400
3'-0"	488	562	611	764	879	956	2125	2445	2658	2777	3195	3473
3'-6"	373	430	467	584	672	731	1625	1870	2033	2124	2444	2657
4'-0"	294	339	369	461	530	577	1282	1476	1605	1676	1929	2097

	1⅛" Broadspan Rim Board Plus											
	1-Ply (1⅛" width)						2-Ply (2¼" width) *can only be used as 2-ply minimum*					
	9½"			11⅞"			14"			16"		
Clear Span	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)	Floor (100%)	Roof Snow (115%)	Roof Non-Snow (125%)
1'-6"	1689	1943	2112	2640	3037	3301	7341	7425	7425	7425	7425	7425
2'-0"	1080	1242	1351	1688	1942	2111	4695	5400	5871	5940	5940	5940
2'-6"	749	862	937	1171	1347	1465	3257	3747	4074	4256	4896	4950
3'-0"	549	632	687	859	989	1075	2391	2751	2991	3124	3594	3908
3'-6"	420	483	526	657	756	822	1828	2104	2287	2389	2749	2989
4'-0"	331	381	415	518	597	649	1442	1660	1805	1886	2170	2360

NOTES

1. Values shown are the maximum uniform (total) loads, in pounds per lineal foot (plf), that can be applied to the header in addition to its own weight. The table meets a deflection criteria of L/360 live load and L/240 total load. 1-ply loads as shown can be doubled for 2-ply capacity.
2. Table is based on uniform loads for only single spans under dry-use conditions (moisture content less than 16%). The span is the clear span (inside-face to inside-face of bearing) for the rough opening. A minimum end bearing length of 6 inches is used for design span.
3. When a 1-ply is shown, the rim board joint cannot occur over the opening or within 12" of the opening. If a second ply is indicated, the second ply must have at least 6" end bearing length beyond the opening.
4. Bearing lengths are based on 550 psi bearing stress. Bearing stresses cannot be increased for duration of load. **Bearing length may need to be increased if support member's allowable bearing stress is less.**
5. Lateral support is required along the span at intervals not exceeding 24" o.c. for both parallel and perpendicular framing conditions.
6. Headers deeper than 11⅞" must only be used in multiple-ply members. Match header depth to I-joist depth. A 2-ply header can be used to increase capacity and to avoid hanger capacity reductions.
7. For 2-plies, fasten with minimum 10d (0.128" x 3") nails as indicated in table:

	2-ply 9½" and 11⅞"	2-ply 14" and 16"
Partial side-loading/top-loading @ 50% min.	3 rows 10d @ 6" o.c.	4 rows 10d @ 6" o.c.
100% top-loaded (evenly)	3 rows 10d @ 12" o.c.	4 rows 10d @ 12" o.c.

8. Use only face-mount hangers with nails clinched. Consult hanger manufacturer for required nailing. Decrease allowable hanger capacities for 1-ply headers as follows:

	Hanger capacity reduction	
Hanger Nail	1-ply 1" rim	1-ply 1⅛" rim
10d	32%	24%
16d	38%	31%

9. For loading conditions beyond the provisions of this table, use properly sized I-joist or LVL. For APA Rated Rim Board, see APA Form No. W345.

Framing Connectors

GENERAL NOTES

1. Capacity is for the stated duration of load—100% floor loading—115% roof snow loading. Connector capacity depends on the model selected, quantity and size of nails used, and the size and type of fastener support. Stated capacity is based on manufacturer's required nailing and modifications for header type. Spruce-Pine-Fir (SPF) web filler has been assumed for all I-joist series and depths. Higher capacities may be available based on different header materials; please refer to appropriate reference/design guide from the connector manufacturer for expanded design information. Some connector/header/fastener combinations may not meet maximum joist reaction capacities and a qualified designer should be consulted. Clinch all nails across grain when possible. Variable pitch connector values are based on SPF wood plates.
2. Values for LVL and I-joist headers are tabulated. To achieve design capacity shown, use the respective nails shown and footnoted. In general, LVL header nails will either be 10d or 16d.
3. Nailing key. "H" column indicates number and size of nails to connect hanger to supporting header. "J" column indicates number and size of nails to attach the hanger to the joist. "P" indicates nails to connect to plate. Fill all nail holes as required by hanger manufacturer. Nails 10d x 1½" are 0.148" x 1½" long, 10d nails are 0.148" x 3" long and 16d are 0.162" x 3½" long.
4. Connector model numbers shown are for Simpson Strong-Tie® Company, Inc. 1-800-999-5099 and USP Structural Connectors® 1-800-328-5934. Some locations carry similar products produced by other manufacturers. Contact your local building material retailer for conversion information and details. Other connector designs are available for specialized applications.

Top Mount Hangers[1]

	Single I-Joist													Double I-Joist												
Joist Series	Joist Width	Joist Depth	Simpson Hanger	Cpcy Lbs-100% Hdr		10d x 1½" Nailing[3] H[3,5]		J[3]	USP Hanger	Cpcy Lbs-100% Hdr		10d x 1½" Nailing[3] H[3,5]		J[3]	Joist Width	Joist Depth	Simpson Hanger	Cpcy Lbs-100% Hdr		10d x 1½" Nailing[3] H[3,4]		J[3]	USP Hanger	Cpcy Lbs-100% Hdr		10d x 1½" Nailing[3] H[3,4]		J[3]
				LVL[5]	IJ	Top	Face			LVL[5]	IJ	Top	Face					LVL[4]	IJ	Top	Face			LVL[4]	IJ	Top	Face	
BSI 200	1¾"	9½"	ITS1.81/9.5	1550	922	4	2	-	THO17950	1345	1071	4	2	2	3½"	9½"	MIT49.5	2550	1046	4	4	2	THO17950-2[2]	2330	2236	4	6	6
		11⅞"	ITS1.81/11.88	1550	922	4	2	-	THO17118	1345	1109	4	2	2		11⅞"	MIT411.88	2550	1046	4	4	2	THO17118-2[2]	2330	2236	4	6	6
		14"	ITS1.81/14	1550	922	4	2	-	THO17140	1760	1496	4	6	2		14"	MIT414	2550	1046	4	4	2	THO17140-2[2]	2330	2236	4	6	6
BSI 400, 700	2⁵⁄₁₆"	9½"	ITS2.37/9.5	1550	922	4	2	-	TFL2395	1645	1058	4	2	2	4⅝"	9½"	MIT359.5-2	2550	1046	4	4	2	THO23950-2[2]	3535	2236	4	6	6
		11⅞"	ITS2.37/11.88	1550	922	4	2	-	TFL23118	1645	1058	4	2	2		11⅞"	MIT3511.88-2	2550	1046	4	4	2	THO23118-2[2]	3535	2236	4	6	6
		14"	ITS2.37/14	1550	922	4	2	-	TFL2314	1645	1058	4	2	2		14"	MIT3514-2	2550	1046	4	4	2	THO23140-2[2]	3535	2236	4	8	6
		16"	ITS2.37/16	1550	922	4	2	-	TFL2316	1645	1058	4	2	2		16"	MIT4.75/16	2550	1046	4	4	2	THO23160-2[2]	3535	2236	4	8	6
BSI 40S, 60S	2½"	9½"	ITS2.56/9.5	1550	933	4	2	-	TFL2595	1645	896	4	2	2	5"	9½"	MIT39.5-2	2550	886	4	4	2	THO25950-2[2]	3535	1894	4	6	6
		11⅞"	ITS2.56/11.88	1550	933	4	2	-	TFL25118	1645	896	4	2	2		11⅞"	MIT311.88-2	2550	886	4	4	2	THO25118-2[2]	3535	1894	4	6	6
		14"	ITS2.56/14	1550	933	4	2	-	TFL2514	1645	896	4	2	2		14"	MIT314-2	2550	886	4	4	2	THO25140-2[2]	3535	1894	4	8	6
		16"	ITS2.56/16	1550	933	4	2	-	TFL2516	1645	896	4	2	2		16"	MIT5.12/316	2550	886	4	4	2	THO25160-2[2]	3535	1894	4	8	6
BSI 900, 80S	3½"	11⅞"	ITS3.56/11.88	1550	933	4	2	-	THO35118	2050	1476	4	6	2	7"	11⅞"	WPI411.88-2[2,6]	3635	2030	3	-	2	BPH71118[2]	3455	-	4	6	6
		14"	ITS3.56/14	1550	933	4	2	-	THO35140	2715	1955	4	8	2		14"	WPI414-2[2,6]	3635	2030	3	-	2	BPH7114[2]	3455	-	4	6	6
		16"	ITS3.56/16	1550	933	4	2	-	THO35160	2715	1955	4	8	2		16"	WPI416-2[2,6]	3635	2030	3	-	2	BPH7116[2]	3455	-	4	6	6

NOTES

1. Top mount hanger capacities shown are based on the same series and depth of BSI Joists carried. Refer to Detail 1h. All capacities for hangers supported by I-joist headers have been adjusted based on hanger manufacturer requirements.
2. Bearing stiffeners required for BSI Joist carried (cells shaded). Refer to Detail 1h and Web Stiffeners section (see page 18).
3. 10d x 1½" nails are required where number of nails is shown without size of nail.
4. 16d nails must be used to achieve the stated capacity for LVL header.
5. 10d nails must be used to achieve the stated capacity for LVL header.
6. B7.12 hangers can be used with LVL headers. See Simpson literature.

Face Mount Hangers[1]

	Single I-Joist													Double I-Joist												
Joist Series	Joist Width	Joist Depth	Simpson Hanger	Cpcy Lbs-100%		Nailing[3]		USP Hanger	Cpcy Lbs-100%		Nailing[3]			Joist Width	Joist Depth	Simpson Hanger	Cpcy Lbs-100%		Nailing[3]			USP Hanger	Cpcy Lbs-100%		Nailing[3]	
				LVL Hdr	IJ Hdr	H	J		LVL Hdr	IJ Hdr	H	J[3]					LVL Hdr[4]	IJ Hdr	H[4]	J[3]			LVL Hdr	IJ Hdr	H	J[3]	
BSI 200	1¾"	9½"	IUS1.81/9.5	935	810	8-10d	-	THF17925	1140	980	10-10d	2		3½"	9½"	MIU3.56/9	2270	1655	16-10d	2		THF35925	1370	1175	12-10d	2	
		11⅞"	IUS1.81/11.88	1170	1010	10-10d	-	THF17112	1139	980	10-10d	2			11⅞"	MIU3.56/11	2840	2066	20-10d	2		THF35112	1825	1570	16-10d	2	
		14"	IUS1.81/14	1405	1210	12-10d	-	THF17140	1370	1175	12-10d	2			14"	MIU3.56/14	3125	2272	22-10d	2		THF35140	2320	2000	20-10d	2	
BSI 400, 700	2⁵⁄₁₆"	9½"	IUS2.37/9.5	935	810	8-10d	-	THF23925	1370	1175	12-10d	2		4⅝"	9½"	MIU4.75/9	2270	1655	16-10d	2		THF23925-2[2]	1625	1400	14-10d	6-10d	
		11⅞"	IUS2.37/11.88	1170	1010	10-10d	-	THF23118	1595	1370	14-10d	2			11⅞"	MIU4.75/11	2840	2066	20-10d	2		THF23118-2[2]	1855	1600	16-10d	6-10d	
		14"	IUS2.37/14	1405	1210	12-10d	-	THF23140	2090	1800	18-10d	2			14"	MIU4.75/14	3125	2272	22-10d	2		THF23140-2[2]	2540	2180	20-10d	6-10d	
		16"	IUS2.37/16	1640	1415	14-10d	-	THF23160	2550	2200	22-10d	2			16"	MIU4.75/16	3410	2478	24-10d	2		THF23160-2[2]	3050	2615	24-10d	6-10d	
BSI 40S, 60S	2½"	9½"	IUS2.56/9.5	935	810	8-10d	-	THF25925	1370	1175	12-10d	2		5"	9½"	MIU5.12/9	2270	1655	16-10d	2		THF25925-2[2]	1390	1200	14-10d	6-10d	
		11⅞"	IUS2.56/11.88	1170	1010	10-10d	-	THF25112	1595	1370	14-10d	2			11⅞"	MIU5.12/11	2840	2066	20-10d	2		THF25112-2[2]	1855	1600	16-10d	6-10d	
		14"	IUS2.56/14	1405	1210	12-10d	-	THF25140	2090	1800	18-10d	2			14"	MIU5.12/14	3125	2272	22-10d	2		THF25140-2[2]	2540	2180	20-10d	6-10d	
		16"	IUS2.56/16	1640	1415	14-10d	-	THF25160	2550	2200	22-10d	2			16"	MIU5.12/16	3410	2478	24-10d	2		THF25160-2[2]	3050	2615	24-10d	6-10d	
BSI 900, 80S	3½"	11⅞"	IUS3.56/11.88	1405	1210	12-10d	-	THF35112	1825	1570	16-10d	2		7"	11⅞"	HU412-2[2]	2145	1558	16-10d	6-10d		HD7120[2]	2255[4]	1393	16-10d[4]	6-10d	
		14"	IUS3.56/14	1405	1210	12-10d	-	THF35140	2320	2000	20-10d	2			14"	HU414-2[2]	2680	1949	20-10d	8-10d		HD7140[2]	2820[4]	1742	20-10d[4]	8-10d	
		16"	IUS3.56/16	1640	1415	14-10d	-	THF35157	2550	2200	22-10d	2			16"	HU414-2[2]	2680	1949	20-10d	8-10d		HD7160[2]	3385[4]	2092	24-10d[4]	8-10d	

NOTES

1. Face mount hanger capacities shown are based on support by LVL or I-joist headers with (SPF) filler and backer blocks as required for proper installation. Refer to Details 1h and 2a. Use 10d x 1½" nails to replace any nail into I-joist header flanges.
2. Bearing stiffeners required for BSI Joist carried (cells shaded). Refer to Detail 1h and Web Stiffeners section (see page 18).
3. 10d x 1½" nails are required where only a number of nails is shown.
4. 16d nails must be used to achieve the stated capacity for LVL header.

Framing Connectors (continued)

Refer to General Notes on page 33.

Skewed 45° Hangers[1]

Joist Series	Joist Width	Joist Depth	Simpson Hanger	Cpcy Lbs - 100%		Nailing[3]		USP Hanger	Cpcy Lbs - 100%		Nailing[3]	
				LVL Hdr[4]	IJ Hdr	H[4]	J[3]		LVL Hdr	IJ Hdr	H	J[3]
BSI 200	1¾"	9½"	SUR/L1.81/9	1595	1159	12-10d	2	SKH1720L/R[2]	1625	1400	14-10d	10
		11⅞"	SUR/L1.81/11	2130	1420	16-10d	2	SKH1724L/R[2]	1855	1600	16-10d	10
		14"	SUR/L1.81/14	2500	1508	20-10d	2	SKH1724L/R[2]	1855	1600	16-10d	10
BSI 400, 700	2⅝16"	9½"	SUR/L2.37/9	2015	1457	14-10d	2	SKH2320L/R[2]	1625	1400	14-10d	10
		11⅞"	SUR/L2.37/11	2305	1663	16-10d	2	SKH2324L/R[2]	1855	1600	16-10d	10
		14"	SUR/L2.37/14	2590	1869	18-10d	2	SKH2324L/R[2]	1855	1600	16-10d	10
		16"	SUR/L2.37/14[2]	2590	1869	18-10d	2	SKH2324L/R[2]	1855	1600	16-10d	10
BSI 40S, 60S	2½"	9½"	SUR/L2.56/9	2015	1457	14-10d	2	SKH2520L/R[2]	1625	1400	14-10d	10
		11⅞"	SUR/L2.56/11	2305	1663	16-10d	2	SKH2524L/R[2]	1855	1600	16-10d	10
		14"	SUR/L2.56/14	2590	1869	18-10d	2	SKH2524L/R[2]	1855	1600	16-10d	10
		16"	SUR/L2.56/14[2]	2590	1869	18-10d	2	SKH2524L/R[2]	1855	1600	16-10d	10
BSI 900, 80S, DBL BSI 200	3½"	9½"	SUR/L410[2]	1860	1352	14-10d	6-10d	SKH410L/R[2,5]	2255[4]	1613	16-10d[4]	10-10d
		11⅞"	SUR/L410[2]	1860	1352	14-10d	6-10d	SKH410L/R[2,5]	2255[4]	1613	16-10d[4]	10-10d
		14"	SUR/L414[2]	2395	1508	18-10d	8-10d	SKH414L/R[2,5]	3100[4]	2218	22-10d[4]	10-10d
		16"	SUR/L414[2]	2395	1508	18-10d	8-10d	SKH414L/R[2,5]	3100[4]	2218	22-10d[4]	10-10d
DBL BSI 400, 700	4⅝"	9½"	HSUR/L4.75/9	1655	1210	12-10d	2	SKH2320L/R-2[2,5]	1665	1430	14-10d	10-10d
		11⅞"	HSUR/L4.75/11	2210	1613	16-10d	2	SKH2324L/R-2[2,5]	1905	1630	16-10d	10-10d
		14"	HSUR/L4.75/14	2760	2016	20-10d	2	SKH2324L/R-2[2,5]	1905	1630	16-10d	10-10d
		16"	HSUR/L4.75/16	3050	2024	24-10d	2	SKH2324L/R-2[2,5]	1905	1630	16-10d	10-10d
DBL BSI 40S, 60S	5"	9½"	HSUR/L5.12/9	1655	1210	12-10d	2	SKH2520L/R-2[2,5]	1665	1430	14-10d	10-10d
		11⅞"	HSUR/L5.12/11	2210	1613	16-10d	2	SKH2524L/R-2[2,5]	1905	1630	16-10d	10-10d
		14"	HSUR/L5.12/14	2760	2016	20-10d	2	SKH2524L/R-2[2,5]	1905	1630	16-10d	10-10d
		16"	HSUR/L5.12/16	3050	2024	24-10d	2	SKH2524L/R-2[2,5]	1905	1630	16-10d	10-10d

NOTES

1. Skewed hanger capacities shown are based on support by LVL or I-joist headers with (SPF) filler and backer blocks as required for proper installation. Refer to Details 1h and 2a. Nails into I-joist header and resulting capacity are indicated for 10d. Use 10d x 1½" nails to replace any nail into I-joist header flanges. 16d nails into only the web section of the I-joist header will increase hanger capacity. Contact hanger manufacturer.
2. Bearing stiffeners required for BSI Joist carried (cells shaded ■). Refer to Details 1h and Web Stiffeners section (see page 18). Stiffeners must be mitered when the end of the joist is mitered.
3. 10d x 1½" nails are required where only a number of nails is shown.
4. 16d nails must be used to achieve the stated capacity for LVL header.
5. Miter cut required on end of joist to achieve design loads.

Field Sloped & Skewed[1]

Joist Series	Joist Width	Simpson Hanger	Cpcy Lbs-115%		Nailing[4]		USP Hanger	Cpcy Lbs-115%		Nailing[4]	
			LVL Hdr	IJ Hdr	H	J[4]		LVL Hdr	IJ Hdr	H	J[4]
BSI 200	1¾"	LSSUI25[3]	1145	995	9-10d	7	LSSH179[3]	1310	1125	10-10d	7
BSI 400, 700	2⅝16"	LSSUI35[3]	1145	995	9-10d	7	LSSH23[3]	1310	1125	10-10d	7
BSI 40S, 60S	2½"	LSSUH310[3]	1600[5]	1163	14-10d[5]	12	LSSH25[3]	1825[5]	1314	14-10d[5]	12
BSI 900, 80S, DBL BSI 200	3½"	LSSU410[3]	1625[5]	1147	14-10d[5]	12	LSSH35[3]	1920[5]	1382	14-10d[5]	12
DBL BSI 400, 700	4⅝"	LSU3510-2[3]	2300[5]	1672	24-10d[5]	16	-	-	-	-	-
DBL BSI 40S, 60S	5"	LSU5.12[3]	1790[5]	1302	24-10d[5]	16	-	-	-	-	-

Adjustable Height[1,7]

Joist Series	Joist Width	Simpson Hanger	Cpcy Lbs-100%		Nailing[4]			USP Hanger	Cpcy Lbs-100%		Nailing[4]		
			LVL Hdr	IJ Hdr	H-Top[4]	H-Face[4,6]	J[4]		LVL Hdr	IJ Hdr	H-Top[4,6]	H-Face[4,6]	J[4]
		9½"-14" deep I-joists						9½"-14" deep I-joists					
BSI 200	1¾"	THAI1.81/22[2]	1400	1060	4	2	2	MSH1722[2]	2165[5]	1695	4[5]	2	4
BSI 400, 700	2⅝16"	THAI3522[2]	1400	1060	4	2	2	MSH2318[2]	2165[5]	2055	4[5]	2	4
BSI 40S, 60S	2½"	THAI322[2]	1400	1060	4	2	2	MSH318[2]	2165[5]	2055	4[5]	2	4
BSI 900, 80S, DBL BSI 200	3½"	THAI422[2]	1400	1060	4	2	2	MSH422[2]	2025[5]	2025	4[5]	2	6-10d
DBL BSI 400, 700	4⅝"	THAI-2[2]	2020[6]	2020	4[6]	2	2	MSH2322-2[2]	2210[5]	2210	4[5]	2	4-10d
DBL BSI 40S, 60S	5"	THAI-2[2]	2020[6]	2020	4[6]	2	2	-	-	-	-	-	-

Variable Pitch[1]

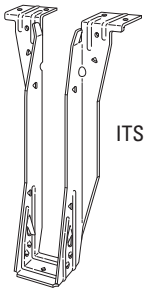
Joist Series	Joist Width	Simpson Hanger	Cpcy Lbs -115%	Nailing[4]		USP Hanger	Cpcy Lbs - 115%	Nailing[4]		USP Hanger	Cpcy Lbs -115%	Nailing[4]	
				P	J[4]			P	J[4]			P	J[4]
		Pitches 3/12 to 12/12				Pitches 1/12 to 6/12				Pitches > 6/12 to 12/12			
BSI 200	1¾"	VPA25	870	8-10d	2	TMP175	1150	6-10d	4	TMPH175[3]	1815	10-10d	8
BSI 400, 700	2⅝16"	VPA35	1020	9-10d	2	TMP23	1970	6-10d	4	TMPH23[3]	1815	10-10d	8
BSI 40S, 60S	2½"	VPA3	1020	9-10d	2	TMP25	1970	6-10d	4	TMPH25[3]	1815	10-10d	8
BSI 900, 80S, DBL BSI 200	3½"	VPA4	1020	11-10d	2	TMP4	1970	6-10d	4	TMPH4[3]	1815	10-10d	8

NOTES

1. Hanger capacities shown are based on support by LVL or I-joist headers with (SPF) filler and backer blocks as required for proper installation. Use 10d x 1½" nails to replace any nail into I-joist header flanges.
2. Bearing stiffeners required for BSI Joist carried (cells shaded ■). Refer to Details 1h and Web Stiffeners section (see page 18).
3. Beveled bearing stiffeners are required for BSI Joist carried (cells shaded ■). Refer to Web Stiffeners section (see page 18). Maximum slope is 12/12. A tie strap is required for all BSI Joists with slopes of 3/12 and greater. Refer to Detail 2a.
4. 10d x 1½" nails are required where only a number of nails is shown.
5. 16d nails must be used to achieve the stated capacity for LVL header.
6. 10d nails must be used to achieve the stated capacity for LVL header.
7. To achieve the minimum nailing configuration, straps must extend over the top of the header at least: 2½" - Simpson, 2" - USP.

Framing Connectors (continued)

SIMPSON Strong-Tie® CONNECTORS®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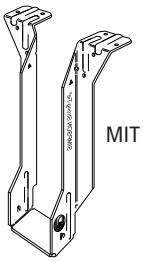
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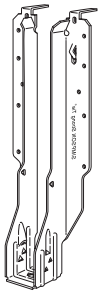
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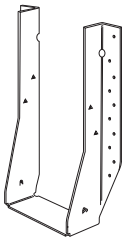
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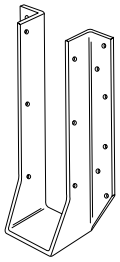
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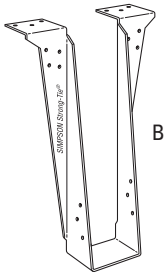
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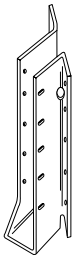
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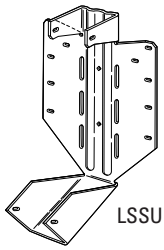
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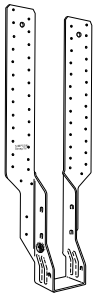
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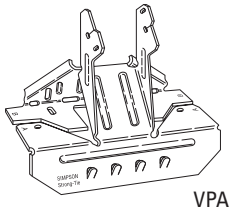
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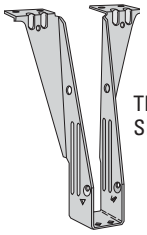
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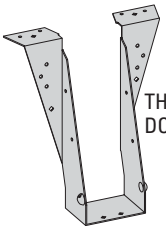
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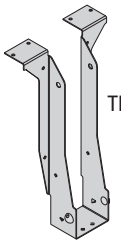
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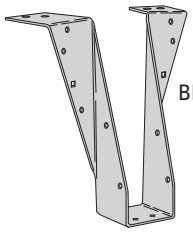
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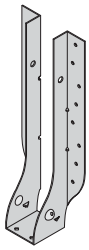
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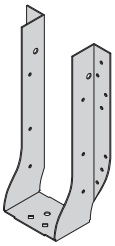
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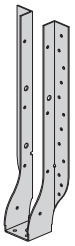
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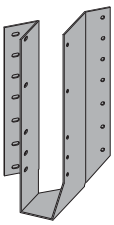
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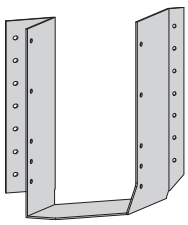
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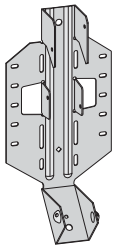
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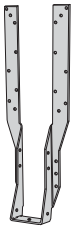
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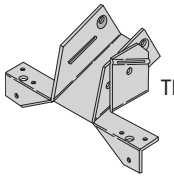
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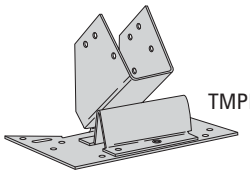
TMPH

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