ICC-ES Evaluation Report

ESR-2551

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DIVISION: 06 00 00—WOOD, PLASTIC, AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

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EVALUATION SUBJECT:

SIMPSON STRONG-TIE® ADJUSTABLE HANGERS AND HIP CONNECTORS FOR WOOD FRAMING

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012 *International Building Code®* (2012 IBC)
- 2012 *International Residential Code®* (2012 IRC)
- 2009 *International Building Code®* (2009 IBC)
- 2009 *International Residential Code®* (2009 IRC)

Property evaluated:

Structural

2.0 USES

The Simpson Strong-Tie® adjustable hangers and hip connectors described in this report are used as wood framing connectors in accordance with Section 2304.9.3 of the IBC. The connectors may also be used in structures regulated under the IRC when an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 General:

The connectors described in this report have a general attribute of field adjustability to form specific connections for one or more roof framing members that intersect at different angles and slopes or to form specified connections for wood trusses, beams, and prefabricated wood I-joists.

3.1.1 HCP Hip-Corner Plate: The HCP hip-corner plate connects a hip roof rafter or beam to the double top plates of two intersecting walls at a 45-degree angle. The connectors are die formed from No. 18 gage galvanized steel. See Table 1 for the connector plate models, connector dimensions, required fasteners, and allowable loads. See Figure 1a for a drawing of the HCP connector and Figure 1b for a drawing a typical installation where the HCP connector is nailed to a roof hip member and the outside corner of the intersecting double top plates.

3.1.2 HRC Hip-Ridge Connector Plate: The HRC hip-ridge connector attaches two 45-degree skewed roof hip members to the end of a ridge member or the flat side of a truss. The U-shaped stirrups of the HRC connectors support the roof hip members, and may be field-adjusted to a slope up to 45 degrees from the horizontal without adversely affecting the load-carrying capacity of the connector. The HRC22, HRC1.81, and HRC42 connectors are fabricated from No. 16 gage galvanized steel. The HRC44 is fabricated from No. 14 gage galvanized steel. See Table 2 for the HRC connector models, connector dimensions, required fasteners, and allowable loads. See Figure 2 for drawings of the HRC connectors and a typical installation.

3.1.3 HHRC Heavy Hip-Ridge Connector Plate: The HHRC heavy hip-ridge connector attaches two 45-degree skewed roof hip members to the end of a ridge member. The U-shaped stirrups of the HHRC connectors support the roof hip members, and may be field-adjusted to a slope up to 45 degrees from the horizontal without adversely affecting the load-carrying capacity of the connector. The HHRC44, HHRC5.37, and HHRC64 connectors are fabricated from No. 12 gage galvanized steel. See Table 9 for the HHRC connector models, connector dimensions, required fasteners, and allowable loads. See Figure 9 for drawings of the HHRC connectors and a typical installation.

3.1.4 LSU, LSSU, and LSSUI Sloped and Skewed Hangers: The LSU, LSSU, and LSSUI hanger series are used to attach wood joists or rafters to wood headers, and may be sloped up or down and skewed left or right, up to 45 degrees. The LSU26, LSSU28, LSSU210, LSSUI25, and LSSUI35 are fabricated from No. 18 gage galvanized steel. The LSSU210-2 and LSSU410 are fabricated from No. 16 gage galvanized steel. See Table 3 for the hanger model numbers, hanger dimensions, required fasteners, and allowable loads. See Figure 3 for drawings of a LSU26 hanger and a typical LSSU/LSSUI and a typical LSSU sloped installation.

3.1.5 THA and THAC Adjustable Truss Hangers: THA and THAC adjustable truss hangers are U-shaped hangers designed for use with wood trusses and wood beams or headers. The hangers have long straight straps that can be field-formed to adjust the location of the truss or beam

relative to the carrying member. The THA29, THA213, THA218, and THA418 hangers are formed from No. 18 gage galvanized steel. The THA218-2, THA222-2, THA418, THAC418, and THA422 hangers are formed from No. 16 gage galvanized steel. See Table 4 for hanger model numbers, hanger dimensions, required fasteners, and allowable loads. Two different installation methods may be used:

1. Minimum nailing schedule, which requires for the THA29 the use of double-shear (slant) nailing for the joist (carried member), and the hanger straps to be field-formed (bent) over the header a minimum of $2^1/_2$ inches (63.5 mm) and nailed according to the requirements shown in Table 4. The minimum nailing schedule for other hangers requires the hanger straps to be bent over the top of the header (carrying member) a minimum of $1^1/_2$ inches (38.1 mm) for the THA213 and THA413 hangers, and a minimum of 2 inches (51 mm) for all THA/THAC hangers, and nailed according to the requirements shown in Table 4; or
2. Maximum nailing schedule, which requires all nails to be installed into the face of the carrying member in accordance with Table 4, and nails used for the joist attachment to be driven at a 45-degree angle so that they penetrate through the corner of the joist into the header, i.e., double shear nailing.

See Figure 4 for drawings of typical THA and THAC hangers, and the THA29 hanger, and a typical installation of a THA hanger supporting a nominally 4-by-2 floor truss where the hanger straps are field-bent and nailed to the supporting wood member, and a detail of double shear (slant) nailing.

3.1.6 THAI Adjustable I-Joist Hanger: The THAI adjustable I-joist hangers have long straight straps that can be field-formed to ensure the top flange of the supported prefabricated wood I-joist is level relative to the supporting wood member. The hangers are formed from No. 18 gage galvanized steel. See Table 5A for hanger model numbers, hanger dimensions, and the width and depth of I-joists intended for use with each model. See Table 5B for fastener schedules and allowable loads. See Figure 5 for drawings of a typical THAI hanger and a typical installation.

3.1.7 THAL/R422 Adjustable Truss Hangers: The THAL422 and THAR422 adjustable truss hangers have a standard skew of 45 degrees and support nominally 4-by-2 floor trusses and nominally 4-inch-wide wood beams. The hangers have long straps that must be bent over the top of the supporting wood member and nailed to the face and top of the carrying member according to the fastener schedule requirements shown in Table 6. The hangers are formed from No. 16 gage galvanized steel. The THAR and THAL are mirror image identical hangers skewed at 45 degrees right and left, respectively. See Table 6 for the hanger dimensions, required fasteners, and allowable loads. Two different installation methods may be used:

1. Minimum nailing schedule, which requires the hanger straps to be field-formed (bent) over the header a minimum of $2^1/_2$ inches (63.5 mm) and nailed into the face of the carrying member with two nails as specified in Table 6; or
2. Maximum nailing schedule, which requires the hanger straps to be field-formed (bent) over the header a minimum of $2^1/_2$ inches (63.5 mm) and nailed into the face of the carrying member with twelve nails as specified in Table 6.

See Figure 6 for a drawing of a THAL/R422 hanger.

3.1.8 VPA Variable Pitch Connectors: VPA variable pitch connectors are field- formed and are used to connect wood roof rafters to wall top plates. The connector can be field-bent to accommodate rafter slopes between 3:12 (14 degrees) and 12:12 (45 degrees). The U-shaped portion of the VPA connector provides a seat for the roof rafter, and the top flange (Flange A) and face flange (Flange B) of the connector are bent and nailed to the wall top plate, as shown in Figure 7. The connectors are formed from No. 18 gage galvanized steel. See Table 7 for connector model numbers, the width of the U-shaped rafter seat, required fasteners, and allowable loads. See Figure 7 for drawings of a VPA connector and a typical installation detail.

3.1.9 LRU Series Hangers: The LRU series hangers are die-formed from No. 18 gage galvanized steel and are used to connect rafter or joist members to a supporting ridge, rim or header member. See Table 8 for the LRU series hanger model numbers, hanger dimensions, required fasteners, and allowable loads. See Figure 8 for a drawing of a typical LRU hanger and installation.

3.2 Materials:

3.2.1 Steel: With the exception of the THAL/R hangers, all of the hangers and connectors described in this report are manufactured from galvanized steel complying with ASTM A653, SS designation, Grade 33, with a minimum yield strength, F_y, of 33,000 psi (227 MPa) and a minimum tensile strength, F_u, of 45,000 psi (310 Mpa). The THAL/R hangers are made with ASTM A653, SS designation, Grade 40, galvanized steel with a minimum yield strength of 40,000 psi (267 Mpa) and a minimum tensile strength of 55,000 psi (379 Mpa). The minimum base metal thicknesses for the hangers and connectors in this report are as follows:

NOMINAL THICKNESS (gage)	MINIMUM BASE-METAL THICKNESS (inch)
No. 12	0.0998
No. 14	0.0685
No. 16	0.0555
No. 18	0.0445

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

The hangers and connectors have a minimum G90 zinc coating specification in accordance with ASTM A653. Some models (designated with a model number ending with Z) are available with a G185 zinc coating specification in accordance with ASTM A653. Some models (designated with a model number ending with HDG) are available with a hot-dip galvanization, also known as “batch” galvanization, in accordance with ASTM A123, with a minimum specified coating weight of 2.0 ounces of zinc per square foot of surface area (600 g/m^2), total for both sides. Model numbers in this report do not include the Z or HDG ending, but the information shown applies. The lumber treater or holder of this report (Simpson Strong-Tie Company) should be contacted for recommendations on minimum corrosion resistance of steel connectors in contact with the specific proprietary preservative treated or fire retardant treated lumber.

3.2.2 Wood: Wood members with which the connectors are used must be either sawn lumber or engineered lumber having a minimum specific gravity of 0.50 (minimum equivalent specific gravity of 0.50 for engineered lumber), and having a maximum moisture content of

19 percent (16 percent for engineered lumber) except as noted in Section 4.1. The thickness of the supporting wood member (header) must be equal to or greater than the length of the fasteners specified in the tables in this report, or as required by wood member design, whichever is greater.

3.2.3 Fasteners: Nails used for connectors described in this report must comply with ASTM F1667 and have the following minimum fastener dimensions and bending yield strengths (F_{yb}):

FASTENER	SHANK DIAMETER (inch)	LENGTH (inches)	F_{yb} (psi)
10d × $1^1/_2$ common	0.148	$1^1/_2$	90,000
10d common	0.148	3	90,000
16d sinker	0.148	$3^1/_4$	90,000
16d × $2^1/_2$ common	0.162	$2^1/_2$	90,000
16d common	0.162	$3^1/_2$	90,000

For **SI:** 1 inch = 25.4 mm, 1 psi = 6.895 kPa.

Fasteners used in contact with preservative treated or fire retardant treated lumber must comply with Section 2304.9.5 of the IBC or Section R317.3 of the IRC, as applicable. The lumber treater or this report holder (Simpson Strong-Tie Company) should be contacted for recommendations on minimum corrosion resistance of fasteners and connection capacities of fasteners used with the specific proprietary preservative treated or fire retardant treated lumber.

HHRC connectors are attached to wood with SD-Series screws described in ESR-3046. For applications under the IBC, SD-Series screws may not be used in contact with preservative-treated or fire-retardant-treated wood, with exception that SD-series screws may be used with SBX/DOT and zinc borate preservative-treated wood in interior, dry environment. For applications under the IRC, the SD-Series wood screws may be used in contact with preservative-treated or fire-retardant-treated wood.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The tabulated allowable loads shown in this report are based on allowable stress design *(ASD) and include the load duration factor,* C_D, corresponding with the applicable loads in accordance with the NDS.

Tabulated allowable loads apply to products connected to wood used under dry conditions and where sustained temperatures are 100ºF (37.8ºC) or less. When products are installed to wood having a moisture content greater than 19 percent (16 percent for engineered wood products), or where wet service is expected, the allowable loads must be adjusted by the wet service factor, C_M, specified in the NDS. When connectors are installed in wood that will experience sustained exposure to temperatures exceeding 100ºF (37.8ºC), the allowable loads in this report must be adjusted by the temperature factor, C_t, specified in the NDS.

Connected wood members must be analyzed for load-carrying capacity at the connection in accordance with the NDS.

4.2 Installation:

Installation of the connectors must be in accordance with this evaluation report and the manufacturer's published installation instructions. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.0 CONDITIONS OF USE

The Simpson Strong-Tie adjustable hangers and hip connectors 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 The connectors must be manufactured, identified and installed in accordance with this report and the manufacturer's published installation instructions. A copy of the instructions must be available at the jobsite at all times during installation.

5.2 Calculations showing compliance with this report must be submitted to the code official. The calculations must be prepared by a registered design professional where required by the statues of the jurisdiction in which the project is to be constructed.

5.3 Adjustment factors noted in Section 4.1 and the applicable codes must be considered, where applicable.

5.4 Connected wood members and fasteners must comply, respectively, with Sections 3.2.2 and 3.2.3 of this report.

5.5 Use of connectors with preservative treated or fire retardant treated lumber must be in accordance with Section 3.2.1 of this report. Use of fasteners with preservative treated or fire retardant treated lumber must be in accordance with Section 3.2.3 of this report.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Joist Hangers and Similar Devices (AC13), dated October 2010 (editorially revised December 2011).

7.0 IDENTIFICATION

The products described in this report are identified with a die-stamped label or an adhesive label, indicating the name of the manufacturer (Simpson Strong-Tie), the model number, and the number of an index evaluation report (ESR-2523) that is used as an identifier for the products recognized in this report.

TABLE 1—HCP HIP CORNER PLATE CONNECTORS

MODEL NO.	JOIST/RAFTER SIZE	FASTENERS[1] (Quantity – Type)		ALLOWABLE LOADS[2,3] (lbs)	
				Uplift	Lateral F_1
		Rafter	Top Plates	C_D = 1.6	C_D = 1.6
HCP2	2x	6-10d x $1^1/_2$	6-10d x $1^1/_2$	645	300
HCP1.81	$1^3/_4$"	6-10d x $1^1/_2$	6-10d x $1^1/_2$	645	300
HCP4	4x	8-10d	8-10d	1,000	265

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

[1]Refer to Figure 1b for typical HCP connector installation and location of required fasteners.
[2]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[3]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.

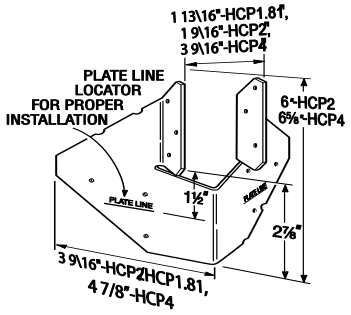


FIGURE 1a—HCP Connector Dimensions

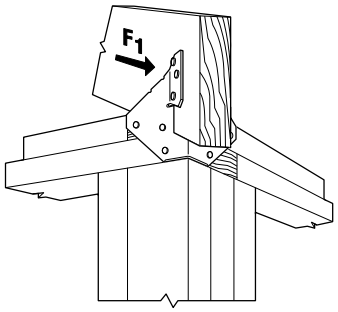


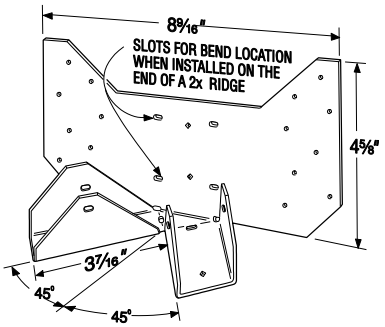
FIGURE 1b—HCP Connector Installation and Allowable Load Directions (See Table 1)

TABLE 2—HRC SERIES HIP/RIDGE CONNECTOR

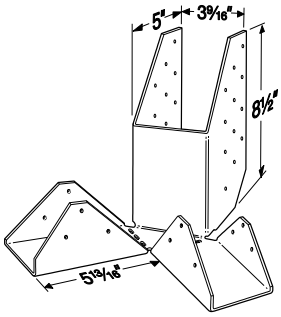
MODEL NO.	RIDGE SIZE	HIP SIZE	FASTENERS (Quantity – Type)		ALLOWABLE LOADS[1,2,3] (lbs)			
					Uplift	Download		
			Ridge (Carrying Member)	Hip[4] (Carried Member)	C_D = 1.6	C_D = 1.0	C_D = 1.15	C_D = 1.25
HRC22	2x or $1^3/_4$"	2x	16-10d x $1^1/_2$	2-10d x $1^1/_2$	240	1,440	1,660	1,800
HRC1.81	2x or $1^3/_4$"	$1^3/_4$"	16-10d x $1^1/_2$	2-10d x $1^1/_2$	240	1,440	1,660	1,800
HRC42	4x	2x	16-16d	2-10d x $1^1/_2$	240	2,100	2,100	2,100
HRC44	4x	4x	24-16d	6-16d	480	3,215	3,550	3,550

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

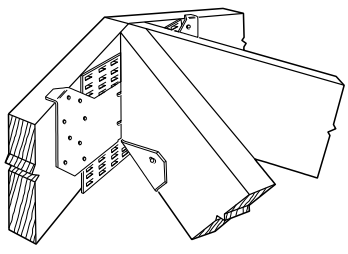
[1]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[2]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[3]Total load carried by connector is shown. Allowable load for each hip is one half of the tabulated value.
[4]Number of fasteners shown is for each hip carried. Total number of fasteners to hips is double the tabulated quantity.



HRC22 (HRC1.81 Similar)



HRC44 (HRC42 Similar)



HRC22 Installed

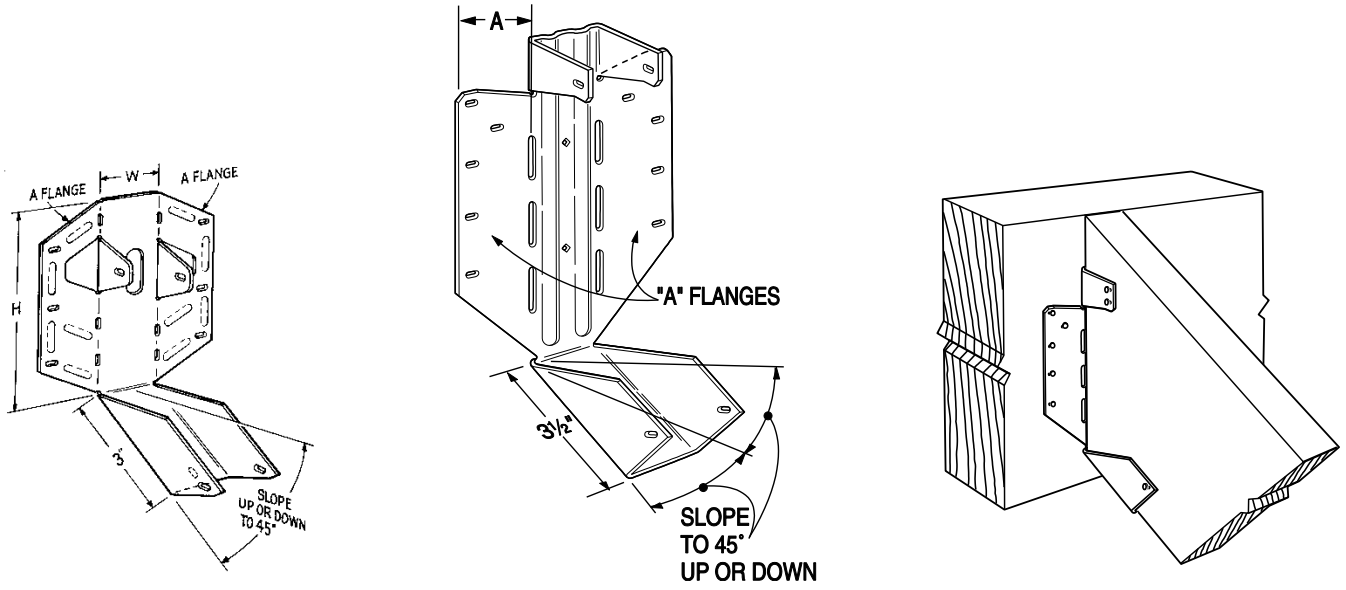
FIGURE 2—HRC CONNECTORS

TABLE 3—LSU/LSSU/LSSUI SKEWED AND SLOPED HANGERS

MODEL NO.	HANGER[1] DIMENSIONS (inches)			FASTENERS (Quantity – Type)			ALLOWABLE LOAD[2] (lbs)						
				Header		Joist	Uplift[3]	Download					
								Sloped Only			Skewed		
	W	H	A	Sloped Only[4]	Skewed or Skewed & Sloped[5]		C_D=1.6	C_D=1.0	C_D=1.15	C_D=1.25	C_D=1.0	C_D=1.15	C_D=1.25
LSU26	1 9/16	4 7/8	1 1/2	6–10d	6–10d	5-10d x 1 1/2	535	665	765	800	665	765	800
LSSU28	1 9/16	7 1/8	1 1/2	10–10d	9–10d	5-10d x 1 1/2	535	1,110	1,275	1,390	990	990	990
LSSU210	1 9/16	8 1/2	1 5/8	10–10d	9–10d	7-10d x 1 1/2	785	1,110	1,275	1,390	1,000	1,145	1,205
LSSUI25	1 13/16	8 1/2	1 1/2	10–10d	9–10d	7-10d x 1 1/2	785	1,110	1,275	1,390	1,000	1,145	1,205
LSSUI35	2 5/16	8 1/2	1 5/8	10–10d	9–10d	7-10d x 1 1/2	785	1,110	1,275	1,390	1,000	1,145	1,205
LSSU210-2	3 1/8	8 1/2	2 7/8	18–16d	14–16d	12-10d x 1 1/2	1,150	2,430	2,795	3,035	1,625	1,625	1,625
LSSU410	3 9/16	8 1/2	2 5/8	18–16d	14–16d	12-10d x 1 1/2	1,150	2,430	2,795	3,035	1,625	1,625	1,625

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

[1]Refer to Figure 3 for definitions of hanger dimension nomenclature (W, H, A).
[2]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[3]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[4]Maximum slope up or down is 45 degrees.
[5]The hanger may be skewed only or skewed and sloped. Maximum skew left or right is 45 degrees.



LSU26 **LSSU/LSSUI** **LSSU Installed**

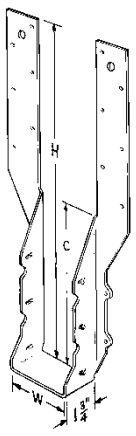
FIGURE 3—LSU/LSSU/LSSUI SKEWED AND SLOPED HANGERS

TABLE 4—THA SERIES TRUSS HANGERS ADJUSTABLE

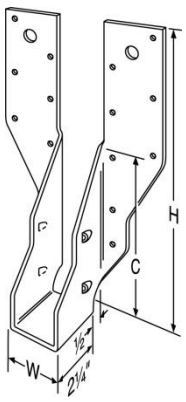
MODEL NO.	DIMENSIONS[1] (inches)			FASTENERS[2] (Quantity – Type)				ALLOWABLE LOADS[3,4] (lbs)			
	W	H	C	Carrying Member		Carried Member		Uplift[4]	Download		
				Top	Face	Straight[5]	Slant[6]	C_D = 1.6	C_D = 1.0	C_D = 1.15	C_D = 1.25
Minimum Nailing Schedule											
THA29	1 5/8	9 11/16	5 1/8	4-10d	4-10d	—	4-10d	560	2,260	2,310	2,350
THA213	1 5/8	13 5/16	5 1/2	4-10d	2-10d	4-10d x 1 1/2	—	—	1,615	1,615	1,615
THA218	1 5/8	17 3/16	5 1/2	4-10d	2-10d	4-10d x 1 1/2	—	—	1,615	1,615	1,615
THA218-2	3 1/8	17 11/16	8	4-16d	2-16d	6-16d x 2 1/2	—	—	1,635	1,635	1,635
THA222-2	3 1/8	22 3/16	8	4-16d	2-16d	6-16d x 2 1/2	—	—	1,635	1,635	1,635
THA413	3 5/8	13 5/16	4 1/2	4-10d	2-10d	4-10d	—	—	1,615	1,615	1,615
THA418	3 5/8	17 1/2	7 7/8	4-16d	2-16d	6-16d	—	—	1,635	1,635	1,635
THAC418	3 5/8	17 1/2	7 7/8	4-16d	2-16d	6-16d	—	—	1,635	1,635	1,635
THA422	3 5/8	22	7 7/8	4-16d	2-16d	6-16d	—	—	1,635	1,635	1,635
Maximum Nailing Schedule[7]											
THA29	1 5/8	9 11/16	5 1/8	—	16-10d	—	4-10d	560	2,125	2,310	2,350
THA213	1 5/8	13 5/16	5 1/2	—	14-10d	—	4-10d	930	1,795	1,840	1,870
THA218	1 5/8	17 3/16	5 1/2	—	18-10d	—	4-10d	930	1,795	1,840	1,870
THA218-2	3 1/8	17 11/16	8	—	16-16d	—	6-16d	1,550	2,830	3,050	3,050
THA222-2	3 1/8	22 3/16	8	—	22-16d	—	6-16d	1,550	3,510	3,595	3,650
THA413	3 5/8	13 5/16	4 1/2	—	14-10d	—	4-10d	930	1,940	2,235	2,400
THA418	3 5/8	17 1/2	7 7/8	—	16-16d	—	6-16d	1,550	2,830	3,050	3,050
THAC418	3 5/8	17 1/2	7 7/8	—	16-16d	—	6-16d	1,550	2,830	3,050	3,050
THA422	3 5/8	22	7 7/8	—	22-16d	—	6-16d	1,550	3,630	4,090	4,145

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

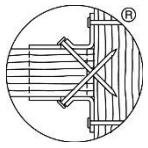
[1]Refer to Figure 4 for definitions of hanger dimension nomenclature (W, H, C).
[2]There are two nailing configurations:
a. Minimum Nailing Schedule: The hanger straps must be field formed (bent) over the top of the carrying member as described in Section 3.1.4 of this report and nailed as specified in the table.
b. Maximum Nailing Schedule: The hanger straps may be bent over the top of the header or straight up the face of the header and nailed as specified in the table.
[3]Tabulated allowable load capacities must be selected based on duration of load as permitted by the applicable building code.
[4]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[5]Straight nailing must use nails driven straight (perpendicular) into the joist or truss.
[6]Slant nailing is where nails are driven at a 45 degree angle through the joist and into the header, which is described as double shear nailing in the installation instructions and shown in Figure 4.
[7]For maximum nailing the 16d sinker nails are permitted to be used to replace the 16d common, provided the design loads noted in the table are multiplied by a factor of 0.85.



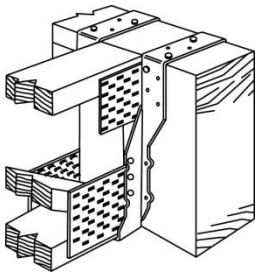
THA



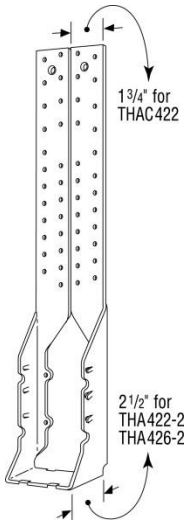
THA29



Slant Nailing



Typical THA Installation



THAC

FIGURE 4—THA SERIES TRUSS HANGERS ADJUSTABLE

TABLE 5A—THAI ADJUSTABLE I-JOIST HANGER DIMENSIONS

MODEL NO.	JOIST DIMENSIONS (inches)			HANGER DIMENSIONS[1] (inches)		
	Width	Depth		W	H	C
		Minimum	Maximum			
THAI222	$1^1/_2$	$9^1/_4$	14	$1^9/_{16}$	$22^7/_8$	$9^3/_8$
THAI1.81/22	$1^3/_4$	$9^1/_4$	14	$1^{13}/_{16}$	$22^3/_4$	$9^1/_4$
THAI2.06/22	2	$9^1/_4$	14	$2^1/_{16}$	$22^5/_8$	$9^1/_8$
THAI2.1/22	$2^1/_{16}$	$9^1/_4$	14	$2^1/_8$	$22^9/_{16}$	$9^1/_8$
THAI3522	$2^1/_4$ (min), $2^5/_{16}$ (max)	$9^1/_4$	14	$2^5/_{16}$	$22^1/_2$	9
THAI322	$2^1/_2$	$9^1/_4$	14	$2^9/_{16}$	$22^3/_8$	$8^7/_8$
THAI422	$3^1/_2$	$9^1/_4$	14	$3^9/_{16}$	$21^7/_8$	$8^3/_8$

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

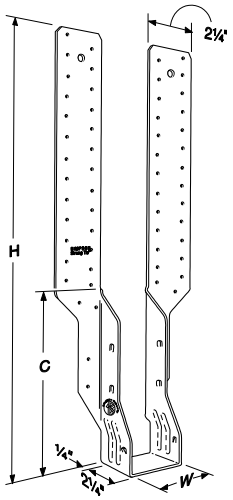
[1]Refer to Figure 5 (this page) for definitions of hanger nomenclature (W, H, C).

TABLE 5B—THAI ADJUSTABLE I-JOIST HANGER FASTENER SCHEDULE AND ALLOWABLE LOADS[1]

MODEL NO.	NAILING CONFIGURATION	FASTENERS[2] (Quantity – Type)			ALLOWABLE LOAD[3] (lbs)			
		Header		Joist	Uplift[4,5]	Download		
		Top	Face		C_D = 1.6	C_D = 1.0	C_D = 1.15	C_D = 1.25
THAI	Minimum[6]	4-10d	2-10d	2-10d x $1^1/_2$	—	1,835	1,835	1,835
		4-10d x $1^1/_2$	2-10d x $1^1/_2$	2-10d x $1^1/_2$	—	1,400	1,400	1,400
	Maximum[7]	—	20-10d	2-10d x $1^1/_2$	215	2,200	2,200	2,200

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

[1]The hangers must be used with prefabricated wood I-joists with web stiffeners. The lesser allowed load values of the THAI connector values in the table or the allowable capacity of the value of the prefabricated wood I-joist listed in the applicable ICC-ES evaluation report, must govern.
[2]16d sinkers (0.148-inch shank diameter by $3^1/_4$ inches long) are permitted to replace 10d common nails (0.148-inch shank diameter by 3 inches long).
[3]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[4]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[5]To achieve the tabulated allowable uplift load, a minimum of two 10d nails must be installed into the face of the carrying member.
[6]The minimum nailing configuration is shown in Figure 5a for top nailing installations. The strap must be field-formed over the top of the header by a minimum of $2^1/_2$ inches.
[7]The maximum nailing configuration requires the carrying beam/header to have a minimum depth of 16 inches and all 20-10d nails installed into the face of the carrying beam/header. The allowable download must be reduced by the allowable nail shear capacity for each nail less than maximum.



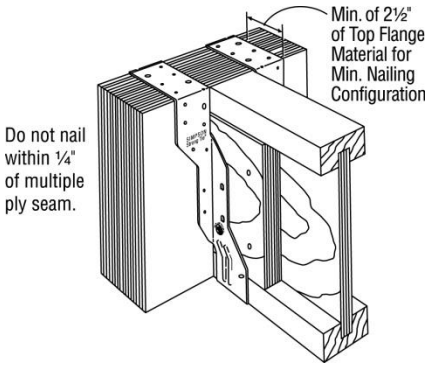


Figure 5a— Typical THAI Hanger Installation with Minimum Nailing Configuration (See Table 5B)

FIGURE 5—THAI ADJUSTABLE I-JOIST HANGER

TABLE 6—THAL/R422 (FACTORY SKEWED 45°) ADJUSTABLE TRUSS HANGER

MODEL NO.	HANGER DIMENSIONS (inches)			FASTENERS (Quantity – Type)				ALLOWABLE LOADS[1] (lbs)			
				Carrying Member		Carried Member		Uplift[2]	Download[3]		
	Seat Width (W)	Hanger Height (H)	Joist Nailing Height (C)	Top	Face	Straight	Slant[4]	C_D = 1.6	C_D= 1.0	C_D=1.15	C_D=1.25
THAL422 and THAR422	$3^5/_8$	$22^5/_8$	8	4–10d	2–10d	1–10d	2–10d x $1^1/_2$	---	1,090	1,090	1,090
				4–10d	12–10d	1–10d	2–10d x $1^1/_2$	310	1,675	1,675	1,675

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

[1]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[2]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[3]There are two different installation methods. The minimum nailing installation has 10 fewer face nails than the maximum nailing installation. For each method the straps are field formed over the top of the carrying member a minimum of $2^1/_2$ inches (4 mm) and nailed to the top and face of the carrying member with the quantity of 10d common nails shown in the table.
[4]Slant nailing are nails driven at a 45-degree angle through the joist and into the header, which is described as double shear nailing in the installation instructions and shown in Figure 4 of this report.

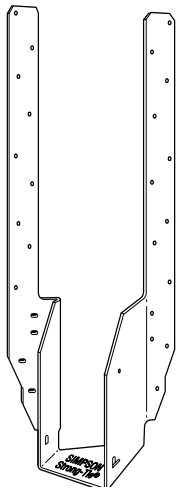


FIGURE 6—THAL/R422 HANGER

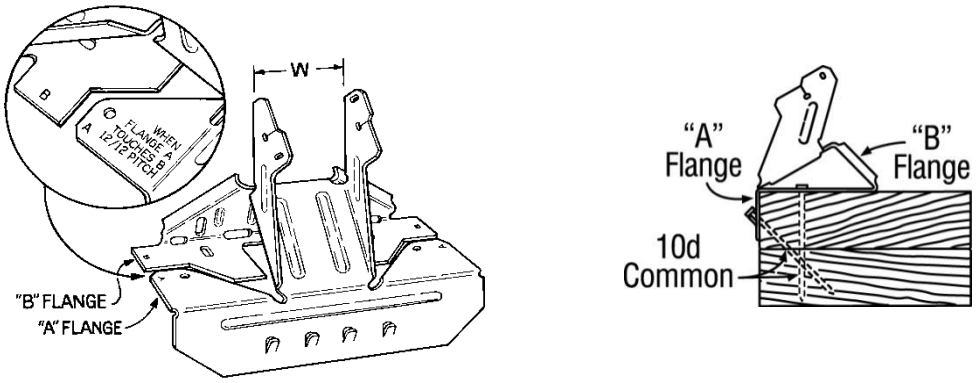


FIGURE 7—VPA VARIABLE PITCH CONNECTOR

TABLE 7—VPA VARIABLE PITCH CONNECTORS

MODEL NO.	CONNECTOR WIDTH (W) (inches)	FASTENERS (Quantity – Type)		ALLOWABLE LOAD[1](lbs)			
		Plates	Joist	Uplift[2]	Download		
				C_D = 1.6	C_D = 1.0	C_D = 1.15	C_D = 1.25
VPA2	$1^{9}/_{16}$	8–10d	4–10d x $1^{1}/_{2}$	295	1,050	1,050	1,050
VPA25	$1^{13}/_{16}$	8–10d	4–10d x $1^{1}/_{2}$	295	1,050	1,050	1,050
VPA3	$2^{9}/_{16}$	9–10d	4–10d x $1^{1}/_{2}$	295	1,230	1,230	1,230
VPA35	$2^{5}/_{16}$	9–10d	4–10d x $1^{1}/_{2}$	295	1,230	1,230	1,230
VPA4	$3^{9}/_{16}$	11–10d	4–10d x $1^{1}/_{2}$	295	1,230	1,230	1,230

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.5 N.

[1]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[2]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.
[3]Connectors must not be substituted for blocking to provide lateral stability or prevent rotation.

TABLE 8—ALLOWABLE LOADS FOR THE LRU SERIES HANGERS

MODEL NO.	HANGER DIMENSIONS[1] (inches)				FASTENERS (Quantity - Type)		ALLOWABLE LOADS[2] (lbs.)			
	W	H	B	Max. C_1	Face	Joist[3]	Uplift[3]	Download		
							C_D = 1.60	C_D = 1.00	C_D = 1.15	C_D = 1.25
LRU26	$1^{5}/_{8}$	$5^{1}/_{4}$	$1^{15}/_{16}$	$1^{3}/_{4}$	4-10d	5-10d	645	855	980	990
					4-16d	5-16d	880	1,020	1,170	1,270
LRU28	$1^{5}/_{8}$	$6^{15}/_{16}$	$1^{15}/_{16}$	$2^{5}/_{8}$	6-10d	5-10d	805	1,050	1,050	1,050
					6-16d	5-16d	805	1,300	1,355	1,355
LRU210	$1^{5}/_{8}$	$8^{3}/_{16}$	$1^{15}/_{16}$	$1^{3}/_{4}$	6-10d	7-10d	1,100	1,285	1,430	1,430
					6-16d	7-16d	1,100	1,535	1,620	1,620
LRU212	$1^{5}/_{8}$	$10^{11}/_{16}$	$1^{15}/_{16}$	$3^{1}/_{2}$	6-10d	7-10d	1,305	1,285	1,430	1,430
					6-16d	7-16d	1,305	1,535	1,755	1,905

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N.

[1]Refer to Figure 8 (this page) for definitions of hanger nomenclature (W, H, B, C_1).
[2]Tabulated allowable loads must be selected based on duration of load as permitted by the applicable building code.
[3]The uplift loads have been increased for wind or earthquake loading with no further increase allowed. The allowable uplift loads must be reduced when other load durations govern.

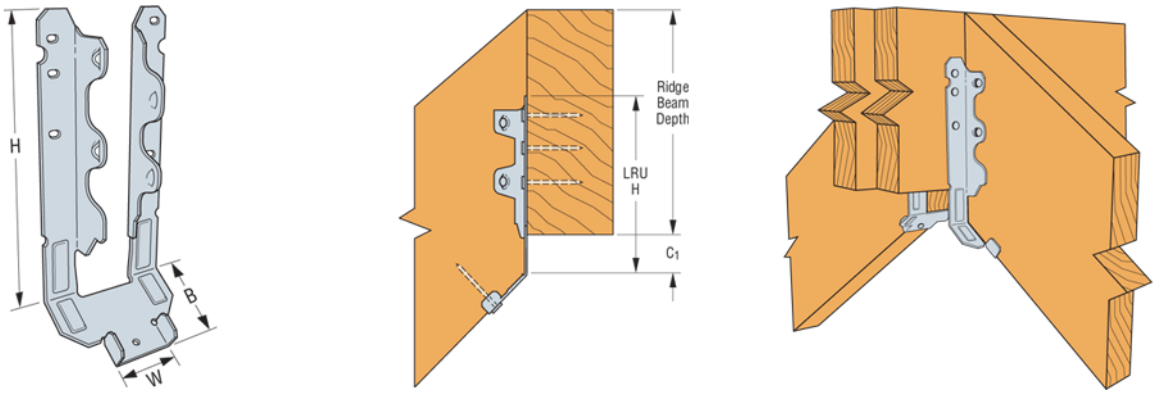


FIGURE 8—LRU HANGER AND TYPICAL INSTALLATIONS

TABLE 9—ALLOWABLE LOADS FOR THE HHRC SERIES HANGERS[1,2]

MODEL NO.	CONNECTION MEMBERS (in.)		CONNECTOR WIDTH (in.)		FASTENERS[3] (Quantity – Type)		ALLOWABLE LOAD PER HIP (lbs)	
	Ridge	Hip	Ridge (W_1)	Hip (W_2)	Ridge	Hip	Download (100/115/125)	Uplift (160)
HHRC44	$3^1/_2$	$3^1/_2$	$3^5/_8$	$3^5/_8$	(40) SD10212	(22) SD10212	2,800	1,970
HHRC5.37/3.56	$5^1/_4$	$3^1/_2$	$5^3/_8$	$3^5/_8$	(40) SD10212	(22) SD10212	2,800	1,970
HHRC64	$5^1/_2$	$3^1/_2$	$5^5/_8$	$3^5/_8$	(40) SD10212	(22) SD10212	2,800	1,970

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N

[1]Allowable loads shown are for each hip. Total load carried at the ridge is 2x the load listed.
[2]Uplift loads include an increase for wind and earthquake loading with no further increase allowed; reduce where other loads govern.
[3]Fasteners are SD10212 with diameter of 0.162 inch by 2.5 inches long Strong-Drive Screws (provided) recognized in ESR-3046.

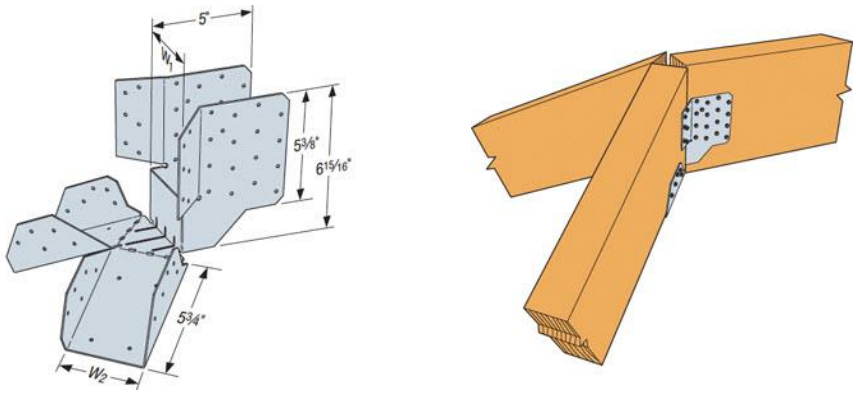


FIGURE 9—HHRC HANGER AND TYPICAL INSTALLATIONS