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Attn: Tim Kaucher, P.E.  
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RESEARCH REPORT: RR 25719  
(CSI # 06090)

BASED UPON ICC EVALUATION SERVICE  
REPORT NO. ESR-2607

REEVALUATION DUE DATE:

August 1, 2013

Issued Date: May 1, 2011

Code: 2011 LABC

**GENERAL APPROVAL** – Reevaluation/Clerical Modification - Connectors for Panelized Roof Construction.

**DETAILS**

The above products are approved when in compliance with the description, use, identification, and findings of Evaluation Report No. ESR-2607, reissued January 1, 2011, of the ICC Evaluation Service Incorporated. The report, in its entirety, is attached and made a part of this general approval.

The parts of Evaluation Report No. ESR-2607 marked by the asterisks are modified by the Los Angeles Building Department from this approval.

**The approval is subject to the following conditions:**

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 job site at all times during installation.
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 statutes of the jurisdiction in which the project is to be constructed.
3. Adjustment factors noted in Section 4.1 and the applicable codes must be considered, where applicable.

RR25719  
Page 1 of 2

Simpson Strong-Tie Co., Inc.

Re: Connectors for Panelized Roof Construction

4. Connected wood members and fasteners must comply respectively with Sections 3.7.2 and 3.7.3 of this report.
5. Use of fasteners with preservative treated or fire retardant treated lumber must be in accordance with Section 3.7.3 of this report.
6. 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 job site at all times during installation.
7. Welded connectors are manufactured under a quality control program with inspections by Professional Service Industries, Inc. (AA-660) or by Intertek Testing Services NA, Inc. (AA-688).

## DISCUSSION

The clerical modification is to change the company address and telephone number.

The report is in compliance with 2011 City of Los Angeles Building Code,

The approval is based on tests complying with ACI3.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revision to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

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Attachments: ICC ES Evaluation Report No. ESR 2607 (9 Pages).

# ICC-ES Evaluation Report

**ESR-2607**

Reissued January 1, 2011

This report is subject to re-examination in two years.

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**DIVISION: 06 00 00—WOOD, PLASTIC, AND COMPOSITES**
**Section: 06 05 23—Wood, Plastic, and Composite Fastenings**
**REPORT HOLDER:**
**SIMPSON STRONG-TIE COMPANY, INC.**  
 5956 WEST LAS POSITAS BOULEVARD  
 PLEASANTON, CALIFORNIA 94588  
 (800) 925-5099  
[www.strongtie.com](http://www.strongtie.com)
**EVALUATION SUBJECT:**
**SIMPSON STRONG-TIE CONNECTORS FOR PANELIZED ROOF CONSTRUCTION**
**1.0 EVALUATION SCOPE**
**Compliance with the following codes:**

- 2009 *International Building Code*® (2009 IBC)
- 2009 *International Residential Code*® (2009 IRC)
- 2006 *International Building Code*® (2006 IBC)
- \* ■ ~~2006 *International Residential Code*® (2006 IRC)~~

**Property evaluated:**

Structural

**2.0 USES**

Simpson Strong-Tie connectors for panelized roof construction are used as wood framing connectors in accordance with Section 2304.9.3 of the IBC. The products 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 HCA and HCCTA Hinge Connectors:**

The HCA hinge connectors support the end of a glued laminated beam to the opposing end of another glued laminated beam of the same width and top elevation. The supporting beam must be at least as deep as the supported beam. An HCCTA hinge connector is identical to an HCA connector, except it has slotted holes along its centerline permitting bolts to be installed in both beams to transfer wind and seismic forces in drag strut applications. The connectors consist of No. 7 gage steel side plates and factory-welded steel top and bottom bearing plates having thicknesses from  $\frac{3}{4}$  inch to  $1\frac{1}{2}$  inches (19 mm to 38 mm). The top and bottom portions of the connector side plates

have holes for installing the required rotation bolts, which resist rotation resulting from the connection offset and resulting load eccentricity between top and bottom bearing plates. See Table 1 hinge connector model numbers, dimensions, required fasteners, and allowable downloads. See Figure 1 for drawings of HCA and HCCTA hinge connectors.

**3.2 F Series Hangers:**

The F series joist hangers are engineered components for panelized construction only. The hangers are fabricated from No. 18 gage galvanized steel. See Table 2 for hanger model numbers, hanger dimensions, required fasteners, and allowable downloads. See Figure 2 for drawings of the F26P hanger and a typical hanger installation where the joist member is used as a stiffener for the wood-based structural-use panels.

**3.3 PCT Purlin Crosssties:**

PCT purlin crosssties connect in-line wood beams to each other where they are separated by a supporting wood beam or girder and transfer axial tension and compression forces induced by wind or seismic loading from one purlin to the other. The crosssties are manufactured from cold-formed, square-shaped, seamless, structural carbon-steel tubing. See Table 3 for model numbers, crossstie dimensions, required fasteners, and allowable loads. See Figure 3 for a drawing of the PCT purlin cross tie and a typical installation showing the PCT cross ties installed in pairs as necessary to achieve the tabulated allowable loads.

**3.4 SA and HSA Strap Anchors:**

The SA and HSA strap anchors connect in-line wood beams to each other where they are separated by a supporting wood beam or girder and transfer axial tension and compression forces induced by wind or seismic loading from one purlin to the other. The SA36 strap anchor is formed from No. 12 gage galvanized steel, and the HSA heavy strap anchors are formed from No. 3 gage galvanized steel. See Table 4 for model numbers, strap anchor dimensions, required fasteners, and allowable loads. See Figure 4 for a drawing of typical installations of the SA and HSA purlin strap ties.

**3.5 VB Knee Braces:**

The knee braces provide lateral support of beams to prevent rotation or lateral displacement, or both, at the point of connection to the beam. The knee braces are not designed for use as a connector to transfer axial tension forces induced by wind or seismic loading. The braces are fabricated from No. 12 gage galvanized steel. See Table 5 for model numbers, range of beam depths permitted for

each model, brace strap length, required fasteners, and allowable tension loads. See Figure 5 for a typical installation of a VB knee brace.

**3.6 HFN Panelized Roof Hangers:**

The HFN series hangers are designed for panelized roof construction. They are die-formed from No. 18 gage galvanized steel. See Table 6 for header nailing schedules, hanger dimensions and allowable loads. See Figure 6 for a typical HFN hanger.

**3.7 Materials:**

**3.7.1 Steel:** The galvanized connectors described in this report are fabricated from galvanized sheet steel complying with ASTM A 653, 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 galvanized coating conforms to ASTM A653 with a G90 designation. The ungalvanized sheet steel connectors are fabricated from ASTM A 1011, SS designation, Grade 33, steel with a minimum yield strength of 33,000 psi (227 MPa) and a minimum tensile strength of 52,000 psi (359 MPa). The HCA hinge connector side plates have a minimum yield strength of 36,000 psi, and the top and bottom bearing plates are ASTM A36 steel with a minimum yield strength of 36,000 psi (227 MPa) and a minimum tensile strength of 58,000 psi (310 Mpa). The PCT steel tubing conforms to ASTM A 500 and has minimum yield and tensile strengths of 46,000 psi (317 MPa) and 58,000 psi (400 MPa), respectively.

Some models (designated with a model number ending with Z) are available with a G185 zinc coating specification in accordance with ASTM A 653. 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 A 123, with a minimum specified coating weight of 2.0 ounces of zinc per square foot of surface area (610 g/m<sup>2</sup>), total for both sides. Model numbers in this report do not include the Z or HDG ending, but the information shown applies. The PCT crossties are hot-dipped galvanized in accordance with ASTM A 123. HCA hinge connectors have either a painted or powder coated finish and may also be available with the HDG finish. The lumber treater and the holder of this report (Simpson Strong-Tie Company) should be contacted for recommendations on the appropriate coating or material to specify for use of the steel connectors in contact with the specific proprietary preservative treated or fire retardant treated lumber.

The base-metal thicknesses for the connectors in this report are as follows:

NOMINAL THICKNESS (Gage)	MINIMUM BASE-METAL THICKNESS (inches)
18	0.0445
12	0.0975
7	0.1705
3	0.2285

For SI: 1 inch = 25.4 mm.

**3.7.2 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), except as noted in Section 4.1. The thickness of the supporting wood member 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. For installation in engineered wood members, minimum allowable nail spacing and end and edge distances, as specified in the applicable evaluation report for the engineered wood product, must be met.

**3.7.3 Fasteners:** Nails used with connectors described in this report must comply with the material requirements, physical properties, tolerances, workmanship, protective coating and finishes, certification, and packaging and package marking requirements specified in ASTM F 1667. The nails must have the following minimum fastener dimensions and bending yield strengths ( $F_{yb}$ ):

FASTENER	SHANK DIAMETER (inches)	LENGTH (inches)	$F_{yb}$ (psi)
10d x 2 <sup>1</sup> / <sub>8</sub>	0.148	2 <sup>1</sup> / <sub>8</sub>	90,000
10d	0.148	3	90,000
16d	0.162	3 <sup>1</sup> / <sub>2</sub>	90,000
N54A	0.250	2 <sup>1</sup> / <sub>2</sub>	90,000

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

At a minimum, bolts must comply with ASTM A 36 or A 307, and have a bending yield strength ( $F_{yb}$ ) of 45,000 psi (310 MPa).

Nails and bolts used in contact with preservative treated or fire retardant treated lumber must comply with Section 2304.9.5 of the IBC, Section R317.3 of the 2009 IRC or ~~Section R319.3 of the 2006 IRC~~, as applicable. For use with treated lumber, the lumber treater or this report holder (Simpson Strong-Tie Company), or both, should be contacted for recommendations on the appropriate coating or material to specify for the fasteners as well as the connection capacities of fasteners used with the specific proprietary preservative treated or fire retardant treated lumber.

**4.0 DESIGN AND INSTALLATION**

**4.1 Design:**

The tabulated allowable loads shown in the product tables of 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 National Design Specification for Wood Construction and its supplement (NDS).

Tabulated allowable loads apply to products connected to wood used under dry conditions and where sustained temperatures are 100°F (37.8°C) 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 for dowel-type fasteners. When connectors are installed in wood that will experience sustained exposure to temperatures exceeding 100°F (37.8°C), 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. Bolts and nails must be installed in accordance with the applicable provisions in the NDS. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.

### 4.3 Special Inspection:

Periodic special inspection must be conducted when the connectors are components within the main wind-force-resisting system of structures constructed in areas listed in 2009 IBC Section 1706.1 (Section 1705.4 for the 2006 IBC). Special inspection requirements do not apply to structures, or portions thereof, that qualify for exception under 2009 IBC Section 1704.1 or 1706.2 (Section 1704.1 for the 2006 IBC).

Periodic special inspection must be conducted in accordance with the applicable portions of Section 1707 when the connectors are components within the seismic-force-resisting system of structures constructed in Seismic Design Category C, D, E or F. Special inspection requirements do not apply to structures, or portions thereof, that qualify for exception under IBC Section 1704.1, 1705.3 or 1707.3.

For installations under the IRC, special inspection is not normally required. However, for an engineered design where calculations are required to be signed by a registered design professional, periodic special inspection requirements and exemptions are as stated in Sections 4.3.1 and 4.3.2 of this report, as applicable for installations under the IRC.

### 5.0 CONDITIONS OF USE

The Simpson Strong-Tie products 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 statutes 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 3.6.2 and 3.6.3 of this report.

5.5 Use of connectors with preservative treated or fire retardant treated lumber must be in accordance with Section 3.6.1 of this report. Use of fasteners with preservative treated or fire retardant treated lumber must be in accordance with Section 3.6.3 of this report.

5.6 Welded connectors are manufactured under a quality control program with inspections by Professional Service Industries, Inc. (AA-660) or by Intertek Testing Services NA, Inc. (AA-688).

### 6.0 EVIDENCE SUBMITTED

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

### 7.0 IDENTIFICATION

The products described in this report are identified with a die-stamped 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. Additionally, the factory-welded connectors manufactured in the United States are identified with the acronym of the inspection agency (PSI), and factory-welded connectors manufactured in Canada are identified with the name of the inspection agency (Intertek).

TABLE 1—HCA AND HCCTA SERIES HINGE CONNECTORS<sup>1,2</sup>

MODEL NO.	DIMENSIONS (inches)			BOLT DIA. (in.)	TWO ROTATION BOLTS <sup>3</sup> PER BEAM		THREE ROTATION BOLTS <sup>3</sup> PER BEAM	
	Width for Beams (W)	Bearing Plate <sup>4</sup>			Minimum Connector Height, H <sup>5,6</sup> (in.)	Allowable Downloads <sup>7,8,9</sup> C <sub>D</sub> = 1.25 (lbs)	Minimum Connector Height, H <sup>5,6</sup> (in.)	Allowable Downloads <sup>7,8,9</sup> C <sub>D</sub> = 1.25 (lbs)
		Thickness (PT)	Length (PD)					
HCA5-5	5 1/4	3/4	5	3/4	16	14,350	13	14,350
HCA5-6			6	3/4	20	17,220	16	17,220
HCA5-7			7	3/4	25	20,090	19	20,090
HCA5-9			9	3/4	37	25,830	27	25,830
HCA7-5	6 7/8	1	5	3/4	19	18,900	16	18,900
HCA7-6			6	3/4	24	22,680	19	22,680
HCA7-7			7	3/4	31	26,460	23	16,460
HCA7-9			9	3/4	40	28,865	33	34,020
HCA9-5	8 7/8	1 1/4	5	3/4	23	24,500	17	24,500
HCA9-6			6	3/4	30	29,400	22	29,400
HCA9-7			7	3/4	38	34,300	28	34,300
HCA9-9			9	3/4	40	28,865	40	42,865
HCA11-5	10 7/8	1 1/2	5	3/4	26	30,100	20	30,100
HCA11-6			6	3/4	35	36,120	16	26,120
HCA11-7			7	3/4	40	36,970	33	42,140
HCA11-9			9	3/4	40	28,865	40	42,865

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbs = 4.45 N.

<sup>1</sup>The depth of the hinge connector varies as the depth of the supported beam. Supporting and supported beams must be the same width. Supporting beam needs to be at least as deep as the supported beam.

<sup>2</sup>Tabulated allowable downloads shown for the HCA hinge connectors are also applicable to the HCCTA hinge connectors, which have additional bolt holes about the centerline to resist horizontal loads if the beams are part of the continuous lateral load path.

<sup>3</sup>Rotation bolts must be used to resist rotation resulting from the connection offset and resulting load eccentricity between top and bottom bearing plates.

<sup>4</sup>When hinge connectors are installed, the bearing plates will protrude beyond the top of the beams, which may interfere with the installation of wood-based structural panels and other finish material. The connector may be made flush with the beams by dapping (notching) a recess into the beams to accommodate the bearing plates, which reduces the effective height of the beam by the thickness of the bearing plate (PT).

<sup>5</sup>Where minimum depth of glulam being carried exceeds the dimension shown, allowable loads are not subject to an increase in value. For minimum depth of glued laminated beams smaller than the tabulated depths, allowable loads must be decreased in direct proportion to the two depths. Minimum supported beam depth is 8 inches.

<sup>6</sup>Allowable loads are increased for seven-day duration roof loads, and no further increase is permitted.

<sup>7</sup>No uplift loads are permitted on the connectors.

<sup>8</sup>Loads must be reduced where member shear capacity results in lower values.

<sup>9</sup>Allowable loads are based on an allowable compression perpendicular-to-grain, F<sub>c⊥</sub>, value of 560 psi.

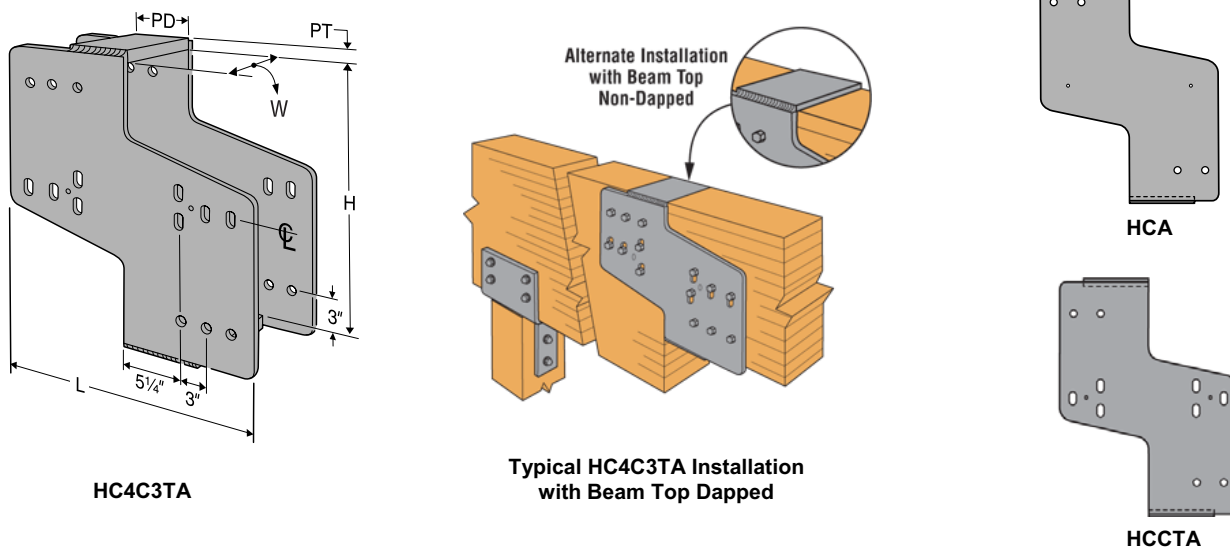


FIGURE 1—HCA AND HCCTA HINGE CONNECTORS

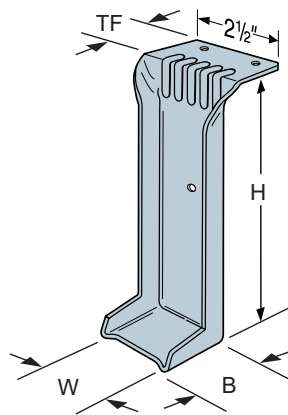
TABLE 2—F SERIES HANGERS<sup>1</sup>

MODEL NO.	HANGER DIMENSIONS (inches)				FASTENERS (Quantity-Size)	ALLOWABLE DOWNLOADS <sup>2</sup> (lbs)
	Hanger Seat Width for Joist (W)	Hanger Height (H)	Hanger Seat Depth for Joist (B)	Top Flange Width (TF)		
F26P	1 <sup>21</sup> / <sub>32</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>16</sub>	2-10d	C <sub>D</sub> = 1.0 C <sub>D</sub> = 1.15 C <sub>D</sub> = 1.25 585
F24-2	3 <sup>1</sup> / <sub>4</sub>	3 <sup>15</sup> / <sub>32</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	2-10d	735
F26-2	3 <sup>1</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>16</sub>	2-10d	800
F44	3 <sup>9</sup> / <sub>16</sub>	3 <sup>7</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	2-10d	880
F46	3 <sup>9</sup> / <sub>16</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>16</sub>	2-10d	785

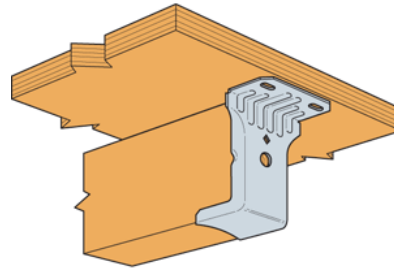
For SI: 1 inch = 25.4 mm, 1 lbs = 4.45 N.

<sup>1</sup>F hangers are only for panelized roof construction where the joist member is used as a panel stiffener for the structural wood-based panel.

<sup>2</sup>Tabulated allowable downloads must be selected based on duration of load as permitted by the applicable building code.



F26P Hanger (others similar)



Typical Installation of a hanger used only for panelized roof construction.

FIGURE 2—F HANGERS

TABLE 3—PCT PURLIN CROSS TIES

MODEL NO.	DIMENSIONS (inches)				MACHINE BOLTS (Quantity-Diameter)	ALLOWABLE TENSION AND COMPRESSION LOADS FOR A PAIR OF PCT CROSS TIES <sup>1</sup> (lbs)								
						Based on Steel Capacity		Based on Double Shear Bolt Capacity <sup>2,3,4,5</sup> and Load Duration Factor (C <sub>D</sub> )						
	Tube Wall Thickness	L	L <sub>1</sub>	L <sub>2</sub>		Tension	Comp.	C <sub>D</sub>	Length of Bolts through Purlin (inches)					
									3 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	
PCT18	1/8	44 <sup>3</sup> / <sub>4</sub>	14	17 <sup>3</sup> / <sub>4</sub>	8 - 5/8	24,665	19,165	1.6	17,235	19,110	19,110	19,090	19,050	
PCT23	1/8	52 <sup>3</sup> / <sub>4</sub>	14	17 <sup>3</sup> / <sub>4</sub>	10 - 5/8	24,665	19,165	1.6	21,390	23,645	23,645	23,620	23,525	
PCT27	3/16	66 <sup>5</sup> / <sub>8</sub>	19 <sup>1</sup> / <sub>2</sub>	23 <sup>1</sup> / <sub>2</sub>	12 - 5/8	39,665	28,665	1.6	24,855	27,705	28,400	28,430	28,255	
PCT38	3/16	71 <sup>5</sup> / <sub>8</sub>	19 <sup>1</sup> / <sub>2</sub>	23 <sup>1</sup> / <sub>2</sub>	12 - 3/4	39,365	26,030	1.6	29,105	33,020	40,485	40,570	40,190	

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

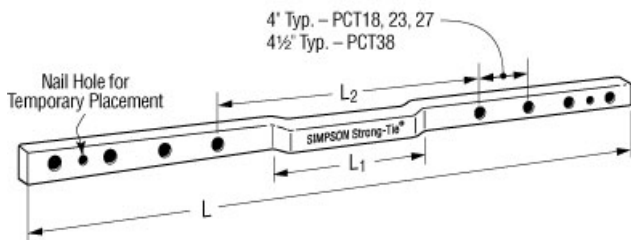
<sup>1</sup>The allowable load for a pair of PCT crosstie connectors must be the lower of the steel capacity or the bolt capacity.

<sup>2</sup>Tabulated allowable loads are based on double shear capacity of the bolts installed through the purlin, which requires the ties to be installed in pairs, as shown in Figure 3.

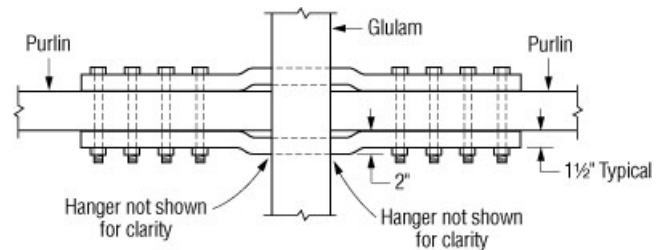
<sup>3</sup>Allowable loads must be selected based on duration of load as permitted by the applicable building code.

<sup>4</sup>The bolt loads have been increased for wind or earthquake loading with no further increase allowed. Allowable loads must be reduced when other load durations govern.

<sup>5</sup>Allowable loads for bolts assume a purlin with a minimum depth of 10<sup>1</sup>/<sub>2</sub> inches.



PCT Purlin Cross Tie



PCT Installed in Pairs

FIGURE 3—PCT PURLIN CROSS TIES

TABLE 4—SA AND HSA PURLIN STRAP TIES

MODEL NO.	STRAP DIMENSIONS (inches)		NAILS (Total Quantity – Size)	BOLTS (Total Quantity – Dia.)	ALLOWABLE TENSION (F1) LOADS <sup>1,2,3,4</sup> (lbs)	
	Width	Length			C <sub>D</sub> = 1.6	
					Nails	Bolts
SA36	2 <sup>1</sup> / <sub>16</sub>	36	22 –16d	4 – 1 <sup>1</sup> / <sub>2</sub>	1,900 <sup>(5)</sup>	1,605 <sup>(5)</sup>
HSA32	3	32	--	2 – 3 <sup>3</sup> / <sub>4</sub>	--	1,910
HSA41	3	41	--	4 – 3 <sup>3</sup> / <sub>4</sub>	--	3,770
HSA50	3	50	--	6 – 3 <sup>3</sup> / <sub>4</sub>	--	5,470
HSA59	3	59	--	8 – 3 <sup>3</sup> / <sub>4</sub>	--	6,940
HSA68	3 <sup>1</sup> / <sub>2</sub>	68	--	10 – 3 <sup>3</sup> / <sub>4</sub>	--	8,350

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

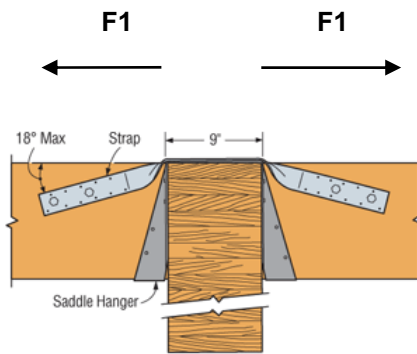
<sup>1</sup>Tabulated allowable tension load (F1) must be selected based on duration of load as permitted by the applicable building code.

<sup>2</sup>The F1 tension loads have been increased for wind or earthquake loading with no further increase allowed. Allowable loads must be reduced when other load durations govern.

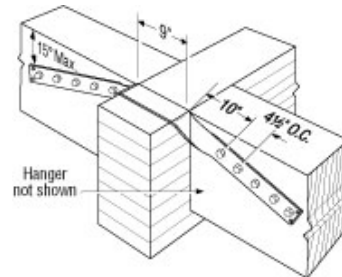
<sup>3</sup>Straps should be installed in pairs at opposite sides of the connected purlins to reduce eccentricity. When only one strap is installed, the design of the purlins needs to consider bending moment about their weak axis induced by an unsymmetrical arrangement of the connection (see Section 3.1.3 of the NDS).

<sup>4</sup>Allowable loads assume a restrained purlin member having a minimum 3<sup>1</sup>/<sub>2</sub>-inch thickness with bolts loaded in single shear.

<sup>5</sup>Bolt and nail values may not be combined.



Typical SA Purlin Strap Tie Installation



Typical HSA Purlin Strap Tie Installation

FIGURE 4—SA/HAS PURLIN STRAP TIES

TABLE 5—VB KNEE BRACES

MODEL NO.	BEAM DEPTH (inches)		LENGTH (feet)	FASTENERS (Total Quantity – Size)	ALLOWABLE TENSION LOADS <sup>1,2,3,4,5</sup> (lbs)	
	Minimum	Maximum			C <sub>D</sub> = 1.0	C <sub>D</sub> = 1.6
VB-5	10	15	5	16 – N54A	990	1,240
VB-7	15	22 <sup>1</sup> / <sub>2</sub>	7	16 – N54A	990	1,240
VB-8	22 <sup>1</sup> / <sub>2</sub>	28 <sup>1</sup> / <sub>2</sub>	8	16 – N54A	990	1,240
VB-10	28 <sup>1</sup> / <sub>2</sub>	36	10	16 – N54A	990	1,240
VB-12	36	42	12	16 – N54A	990	1,240

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

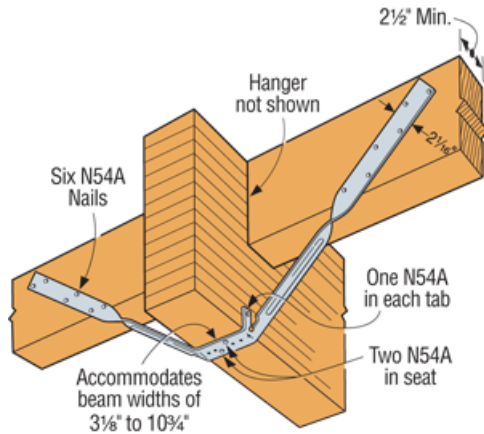
<sup>1</sup>Tabulated allowable tension loads must be selected based on duration of load as permitted by the applicable building code.

<sup>2</sup>The allowable tension loads have been increased for wind or earthquake loading with no further increase allowed. Allowable loads must be reduced when other load durations govern.

<sup>3</sup>Use of the VB Knee Brace to resist compression loads is outside the scope of this report.

<sup>4</sup>The tabulated allowable tension loads are based on braces installed at an approximate 45-degree angle, with a minimum 1<sup>3</sup>/<sub>8</sub>-inch (35 mm) edge distance for nails.

<sup>5</sup>Allowable loads apply to tensile loads along the length of the knee brace strap.



**Typical Installation of a VB Knee Brace: All nail holes at each end of the strap must be filled with the required nails, and four nails must be installed into the bottom of the beam to provide a positive connection.**

FIGURE 5—VB KNEE BRACE

TABLE 6—HFN SERIES ROOF HANGERS<sup>1,2,3</sup>

MODEL	HANGER DIMENSIONS (inches)			FASTENER SCHEDULE (quantity-size)	DFL/SP ALLOWABLE LOADS (lbs)		
	W	H	TF		CD=1.0	CD=1.15	CD=1.25
HF24N	1 <sup>17</sup> / <sub>32</sub>	3 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	2 -10d x 2 <sup>1</sup> / <sub>8</sub>	580	580	580
HF26N	1 <sup>17</sup> / <sub>32</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	2 -10d x 2 <sup>1</sup> / <sub>8</sub>	635	635	635
HF34N	2 <sup>9</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	2 -10d x 2 <sup>1</sup> / <sub>8</sub>	690	690	690
HF36N	2 <sup>9</sup> / <sub>16</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	2 -10d x 2 <sup>1</sup> / <sub>8</sub>	725	725	725

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

<sup>1</sup>Tabulated allowable load capacities shall be selected based on duration of load as permitted by the applicable building code.

<sup>2</sup>The uplift loads have been increased for wind or earthquake loads. No further increase is allowed.

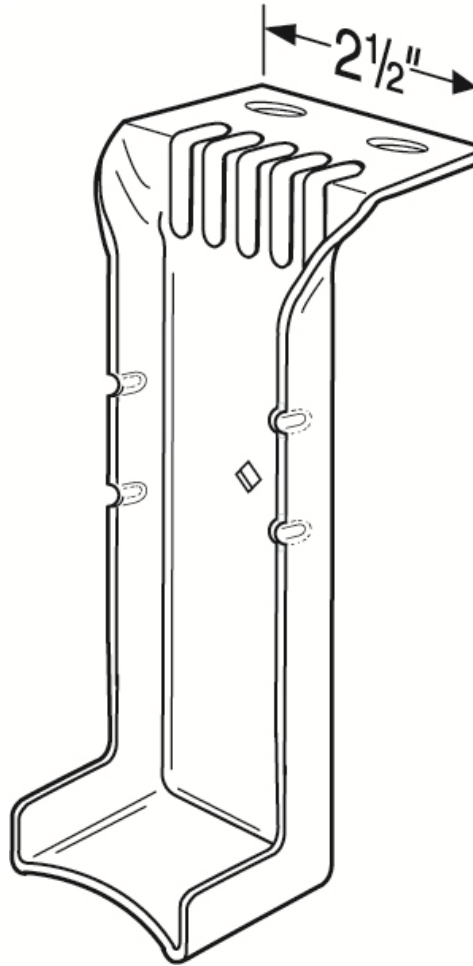


FIGURE 6—HFN HANGER