



## EVALUATION SUBJECT: SIMPSON STRONG-TIE ANGLES, CLIPS, AND TIES

### REPORT HOLDER:

Simpson Strong-Tie Company Inc.  
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CSI Division: 06—Wood, Plastics and Composites  
CSI Section: 06 05 23—Wood, Plastic, and Composite  
Fastenings

## 1.0 SCOPE OF EVALUATION

### 1.1 Compliance to the following codes & regulations:

- 2015, 2012, 2009, and 2006 International Building Code® (IBC)
- 2015, 2012, 2009, and 2006 International Residential Code® (IRC)

### 1.2 Evaluated in accordance with:

- IAPMO UES Evaluation Criteria for Joist Hangers and Miscellaneous Connectors (EC 002-2017)

### 1.3 Properties assessed:

- Structural

## 2.0 PRODUCT USE

Simpson Strong-Tie structural angles, clips and ties are used as wood framing anchors and mechanical fastenings in accordance with Section 2304.10.3 of the 2015 IBC and [2304.9.3](#) of the 2012, 2009, and 2006 IBC. The products may 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 PRODUCT DESCRIPTION

### 3.1 Product information

**3.1.1 A Series Angles:** The A series angles transfer shear loads between wood members and are formed from No. 18 gage steel. [Table 1](#) of this report provides model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.2 A34 and A35 Framing Angles:** The A34 and A35 framing angles connect wood framing members and are fabricated from No.18 gage steel. The connectors have cutouts on each leg and a prong to aid in installation. The A35 angle has slots and bend lines to permit field

adjustments of the legs for two- and three-way tied connections and shall be bent one-time only. [Table 2](#) and [Figure 2](#) of this report provide model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.3 FC Series Framing Clips:** The FC series framing clips transfer shear loads between wood members and are formed from No. 16 gage steel. [Table 3](#) and [Figure 3](#) of this report provide model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.4 GA Series Gusset Angles:** The GA series gusset angles connect wood framing members and are formed from No. 18 gage steel. [Table 4](#) and [Figure 4](#) of this report contain model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.5 H2A, H2.5T, H8, H10A-2, H10S, H14 and HGA10 Hurricane Ties:** The hurricane ties connect wood rafters' or trusses to wood wall plates or studs. The H2A, H2.5T, H8, H10A-2, H10S, and H14 are formed from No. 18 gage steel, and the HGA10 is formed from No. 14 gage steel. [Table 5](#) and [Figure 5](#) of this report contain model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.6 HH Series Header Hangers:** The HH series header hangers transfer wind uplift and lateral loads between wood roof and wall members and are formed from No. 16 gage steel. [Table 6](#) and [Figure 6](#) of this report provide model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.7 L Series Reinforcing Angles:** The L series reinforcing angles connect wood framing members and are formed from No. 16 gage steel. [Table 7](#) and [Figure 7](#) of this report describe model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.8 LCE4 Post Cap:** The LCE4 post cap transfers uplift and lateral forces from a wood beam to a wood post and is formed from No. 20 gage steel. [Table 8](#) and [Figure 8](#) of this report describe model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.9 LS Series Skewable Angles:** The LS series skewable angles transfer loads between wood framing members and are formed from No. 18 gage steel. The angles are designed to allow field skewing from 0 to 135 degrees and shall be bent one time only. [Table 9](#) and [Figure 9](#) of this report contain model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.10 LTP4 and LTP5 Lateral Tie Plates:** The LTP4 and LTP5 lateral tie plates transfer shear loads from the wood top plate to wood rim joist or blocking members and is



formed from No. 20 gage steel. [Table 10](#) and [Figure 10](#) of this report provide model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.11 RBC and RBCP Roof Boundary Clips:** The RBC/RBCP roof boundary clips transfer loads between the roof diaphragm perimeter blocking and wall top plates and are formed from No. 20 gage steel. The clips may be field bend to desired angle one time only. [Table 11](#) and [Figure 11](#) of this report contain model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.12 TJC Jack Truss Connectors:** The TJC Jack Truss Connectors are field skewable connectors that transfer loads from jack trusses, joists, rafters and blocking members to supporting members, and are formed from No. 16 gage steel. [Table 12](#) and [Figure 12](#) of this report describe model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.13 Z Series Panel Stiffener Clips:** The Z2 and Z4, Z44 panel stiffener clips are formed from No. 20 and No. 12 gage steel, respectively. The Z clips are used to support nominally 2-by-4 or 2-by-6 wood blocking between joists or trusses that provide solid backing for ceiling panel material. [Table 13](#) and [Figure 13](#) of this report provide model numbers, dimensions, fastener schedules, allowable loads, and installation details.

**3.1.14 FWANZ Foundation Wall Angles:** The FWANZ foundation wall angles are used to attach the foundation or basement walls to the floor system to resist out-of-plane loads imposed by soil pressure. Each angle fastens to the wood rim-board and wood mudsill with nails. The FWANZ is formed from No. 14 gage steel. [Table 14](#) and [Figure 14](#) of this report provide model numbers, dimensions, fastener schedule, allowable loads, and installation details.

## 3.2 Materials

CONNECTOR STEEL GAGE	CORRESPONDING BASE METAL THICKNESS (inches)
No. 12	0.0975
No. 14	0.0720
No. 16	0.0555
No. 18	0.0445
No. 20	0.0335

For SI: 1 inch = 25.4 mm

**3.2.1 Steel:** The FWANZ, H2A, H2.5T, H8, H14, LCE4, LTP5, RBC, and RBCP connectors described in this report are manufactured from galvanized steel complying with [ASTM A653](#), Grade 40, SS designation with a minimum yield strength of 40,000 psi (227 MPa) and a minimum ultimate tensile strength of 55,000 psi (358 MPa). All other connectors described in this report are manufactured from

galvanized steel complying with ASTM A653, Grade 33, SS designation with a minimum yield strength of 33,000 psi (227 MPa) and a minimum ultimate tensile strength of 45,000 psi (310 MPa).

The connectors have a minimum G90 zinc coating designation complying with ASTM A653. Some models also are available with a G185 zinc coating designation in accordance with ASTM A653 (denoted by model numbers ending in the letter Z). Some models are available with a batch hot-dipped galvanized coating 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<sup>2</sup>), total for both sides (denoted by model numbers ending with the letters HDG). Model numbers in this report do not list the Z or HDG ending, but the information shown applies.

The holder of this report (Simpson Strong-Tie) or the lumber treater shall be contacted for recommendations on minimum corrosion resistance of steel connectors in contact with specific proprietary preservative-treated or fire-retardant-treated lumber.

**3.2.2 Wood:** Wood members with which the connectors are used shall 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 of this report. The thickness (depth) of the wood main member shall be equal to or greater than the length of the fasteners specified in the tables in this report, unless the reduced penetration effect on the load calculation per the applicable ANSI/AWC National Design Specification for Wood Construction and its Supplement (NDS) is taken into account, or as required by wood member design, whichever is greater.

**3.2.3 Fasteners:** Common nails shall comply with [ASTM F1667](#) when used with connectors in this report and shall have the following minimum fastener dimensions and bending yield strengths (F<sub>yb</sub>):

FASTENER	SHANK DIAMETER (inches)	FASTENER LENGTH (inches)	F <sub>yb</sub> (psi)
8d x 1½	0.131	1½	100,000
8d	0.131	2½	100,000
10d x 1½	0.148	1½	90,000
10d	0.148	3	90,000
16d	0.162	3½	90,000

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

Fasteners used in contact with fire-retardant-treated or preservative-treated lumber shall comply with Section 2304.10.5 of the 2015 IBC; Section [2304.9.5](#) of the 2012, 2009, or 2006 IBC; 2015, 2012 or 2009 IRC Section [R317.3](#), or 2006 IRC Section [R319.3](#), as applicable. The report



holder or lumber treater shall be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant-treated lumber.

SDS wood screw fasteners described in [Tables 5](#) and [12](#) of this report shall be Simpson Strong-Tie SDS wood screws recognized in ICC-ES [ESR-2236](#).

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design

The tabulated connector loads shown in this report are for allowable stress design and include the load duration factor,  $C_D$ , corresponding with the applicable loads in accordance with the ANSI/AWC National Design Specification for Wood Construction and its supplement (NDS). Further load duration increases are not permitted other than those shown.

Tabulated allowable loads apply to products connected to wood used where sustained temperatures are 100°F (37.8°C) or less and under dry conditions. The allowable loads shall be adjusted by the wet service factor,  $C_M$ , specified in the NDS for dowel-type fasteners, 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 in this report shall be adjusted by the temperature factor,  $C_t$ , specified in the NDS when connectors are installed in wood that will experience sustained exposure to temperatures exceeding 100°F (37.8°C).

### 4.2 Installation

Installation of the connectors shown in this report shall be in accordance with the manufacturer's published installation instructions and this evaluation report. If there is a conflict between this report and the manufacturer's published installation instructions, the more restrictive prevails.

### 4.3 Special Inspection

**4.3.1** Periodic special inspection shall be conducted in accordance with 2015 IBC Sections 1704.2 and 1705.11, 2012 IBC Section [1705.10](#), 2009 IBC Section [1706](#), or 2006 IBC Section [1704](#), as applicable, when the product series are

components within the main wind-force-resisting system of structures constructed in areas listed in 2015 IBC Section 1705.11, 2012 IBC Section 1705.10, 2009 IBC Section [1706.1](#) and Section [1705.4](#) for the 2006 IBC. Special inspection requirements do not apply to structures, or portions thereof, that qualify for exception under 2015 IBC Sections 1704.2 or 1705.11, 2012 IBC Sections [1704.2](#), [1705.3](#), [1705.10.1](#) or [1705.10.2](#), 2009 IBC Sections [1704.1](#),

[1704.4](#), [1706.2](#) or [1706.3](#) and 2006 IBC Sections [1704.1](#) or [1704.4](#).

**4.3.2** Periodic special inspection shall be conducted in accordance with the applicable subsections of Sections 1704.2 and 1705.12 of the 2015 IBC, Section [1705.11](#) of the 2012 IBC and Section [1707](#) of the 2009 and 2006 IBC when the product series 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 2015 IBC Sections 1704.2 or 1705.12, 2012 IBC Sections 1704.2 or 1705.11, 2009 IBC Sections 1704.1, [1707.3](#) or [1707.4](#) or 2006 IBC Sections 1704.1 or [1707.3](#).

**4.3.3** 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 LIMITATIONS

The Simpson Strong-Tie products described in this report are in compliance with, or are acceptable 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 shall be manufactured, identified and installed in accordance with the manufacturer's published installation instructions and this report. A copy of the instructions shall be available at the jobsite continuously during installation. If there is a conflict between this report and the manufacturer's published installation instructions, the more restrictive prevails.

**5.2** Where applicable, adjustment factors noted in Section 4.1 of this report and the applicable codes shall be considered.

**5.3** Connected wood members and fasteners shall be in compliance, respectively, with Sections 3.2.2 and 3.2.3 of this report.

**5.4** Use of connectors with fire-retardant-treated or preservative-treated lumber shall be in accordance with Section 3.2.1 of this report. Use of fasteners with fire-retardant-treated or preservative-treated lumber shall be in accordance with Section 3.2.3 of this report.

## 6.0 SUBSTANTIATING DATA

Data in accordance with IAPMO UES Evaluation Criteria for the Testing and Analysis of Joist Hangers and Miscellaneous Connectors (EC 002-2017), inclusive of tests and calculations.



## 7.0 IDENTIFICATION

A label shall be affixed on at least one of the following: product, packaging, installation instructions or descriptive literature. The label shall include the company name or trademark, model number, and the IAPMO Uniform ES Mark of Conformity the name of the inspection agency (when applicable) and the Evaluation Report Number (ER-112) to identify the products recognized in this report. A die-stamp label may also substitute for the label. Either Mark of Conformity may be used as shown below:



OR



**IAPMO UES ER-112**

**Brian Gerber, P.E., S.E.**  
Vice President, Technical Operations  
Uniform Evaluation Service

**Richard Beck, PE, CBO, MCP**  
Vice President, Uniform Evaluation Service

**GP Russ Chaney**  
CEO, The IAPMO Group

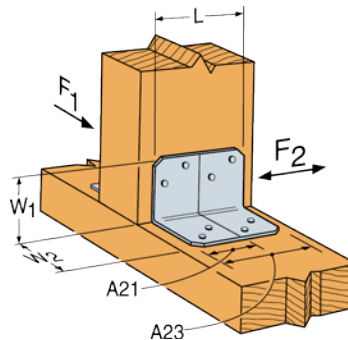
For additional information about this evaluation report please visit  
[www.uniform-es.org](http://www.uniform-es.org) or email at [info@uniform-es.org](mailto:info@uniform-es.org)

**TABLE 1: ALLOWABLE LOADS FOR THE A ANGLES**

MODEL NO.	ANGLE DIMENSIONS <sup>1</sup> (in)			FASTENERS (Quantity-Type)		ALLOWABLE LOADS <sup>2,3,4,5</sup> (lbs)							
	L	W <sub>1</sub>	W <sub>2</sub>	Supporting Member (Base)	Supported Member (Post)	F <sub>1</sub> where C <sub>D</sub> =				F <sub>2</sub> where C <sub>D</sub> =			
						1.0	1.15	1.25	1.6 <sup>6</sup>	1.0	1.15	1.25	1.6 <sup>6</sup>
A21	1 <sup>3</sup> / <sub>8</sub>	2	1 <sup>1</sup> / <sub>2</sub>	2-10d x 1 <sup>1</sup> / <sub>2</sub>	2-10d x 1 <sup>1</sup> / <sub>2</sub>	235	270	290	330	150	150	150	150
A23	2 <sup>3</sup> / <sub>4</sub>	2	1 <sup>1</sup> / <sub>2</sub>	4-10d x 1 <sup>1</sup> / <sub>2</sub>	4-10d x 1 <sup>1</sup> / <sub>2</sub>	475	540	580	680	475	535	535	535
A33	1 <sup>1</sup> / <sub>2</sub>	3	3	4-10d	4-10d	560	625	665	765	340	340	340	340
A44	1 <sup>1</sup> / <sub>2</sub>	4 <sup>9</sup> / <sub>16</sub>	4 <sup>3</sup> / <sub>8</sub>	4-10d	4-10d	560	625	665	775	290	290	290	290

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

- Figure 1 of this report details definitions of angle dimension nomenclature (L, W<sub>1</sub>, W<sub>2</sub>) and allowable load directions (F<sub>1</sub> and F<sub>2</sub>).
- Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
- F<sub>1</sub> and F<sub>2</sub> loads shall not be combined.
- The F<sub>1</sub> allowable loads are for one connector. When angles are installed on each side of wood member, the minimum member thickness shall be 3 inches.
- The F<sub>2</sub> allowable loads apply only when the connectors are used in pairs.
- Allowable loads have been increased for wind or earthquake loading. No further increase is allowed.



**Figure 1 – A21 and A23 Angles**

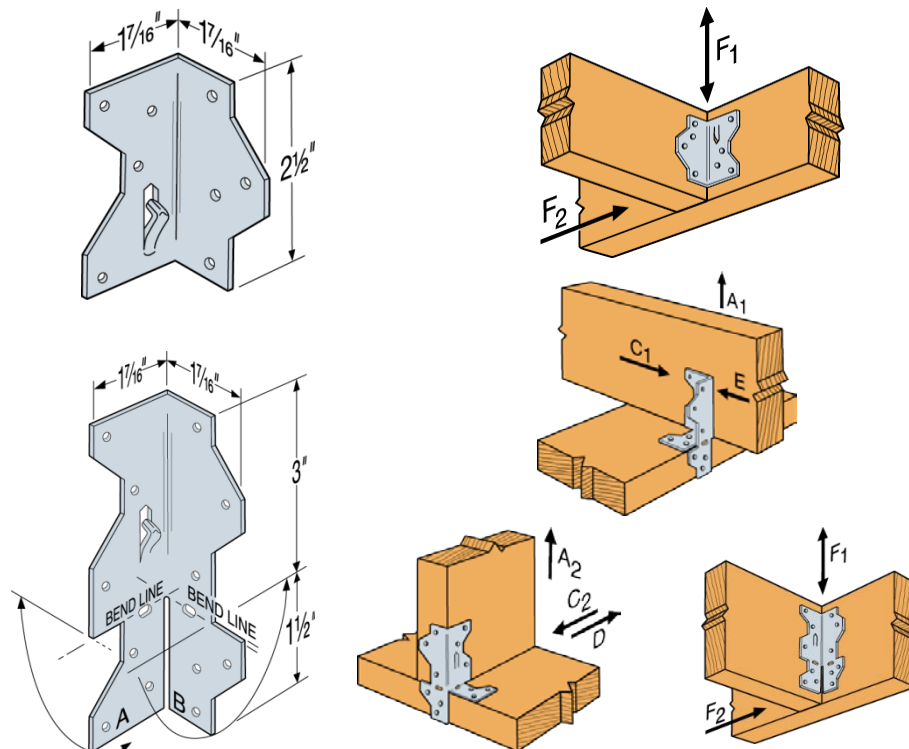


**TABLE 2: ALLOWABLE LOADS FOR THE A34 / A35 FRAMING ANGLES**

MODEL NO.	FASTENERS (Quantity-Type)		DIRECTION OF LOAD <sup>3</sup>	ALLOWABLE LOADS <sup>1,2,4</sup> (lbs)			
	Joist	Header/Plate		C <sub>D</sub> =1.0	C <sub>D</sub> =1.15	C <sub>D</sub> =1.25	C <sub>D</sub> =1.6
A34	4-8dx1½	4-8dx1½	F <sub>1</sub>	395	450	465	465
	4-8dx1½	4-8dx1½	F <sub>2</sub>	395	430	430	430
A35	3-8dx1½	6-8dx1½	A <sub>1</sub>	295	335	350	350
	3-8dx1½	6-8dx1½	C <sub>1</sub>	185	185	185	185
	3-8dx1½	6-8dx1½	E	295	335	360	385
	6-8dx1½	6-8dx1½	A <sub>2</sub>	295	325	325	325
	6-8dx1½	6-8dx1½	C <sub>2</sub>	295	330	330	330
	6-8dx1½	6-8dx1½	D	225	225	225	225
	6-8dx1½	6-8dx1½	F <sub>1</sub>	590	650	650	650
	6-8dx1½	6-8dx1½	F <sub>2</sub>	590	670	670	670

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

1. Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
2. Allowable loads are for one angle. When anchors are installed on each side of the joist, the minimum joist thickness is 3 inches.
3. Connectors are required on both sides of joist to achieve F<sub>2</sub> loads in both directions.
4. Some illustrations below show connections that could cause cross-grain tension or bending of the wood during loading if not reinforced sufficiently. In this case, mechanical reinforcement should be considered.



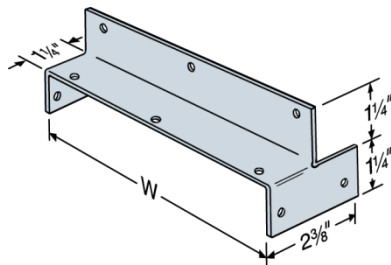
**Figure 2 – A34 and A35 Framing Angles**

**TABLE 3: ALLOWABLE LOADS FOR THE FC FRAMING CLIPS**

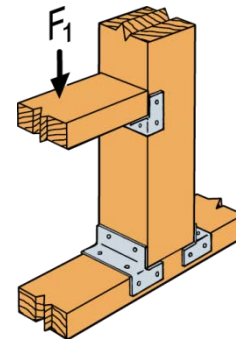
MODEL NO.	CONNECTOR WIDTH (W) (in)	FASTENERS (Quantity-Type)	ALLOWABLE DOWNLOAD, $F_1^{1,2}$ (lbs.)		
			$C_D=1.0$	$C_D=1.15$	$C_D=1.25$
FC4	$3\frac{9}{16}$	8-16d	865	870	870
FC6	$5\frac{1}{2}$	10-16d	1,005	1,140	1,160

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

1. Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
2. Minimum thickness of the supporting member (post) shall be  $2\frac{1}{2}$  inches to achieve the tabulated load value (similar to [Figure 6](#) of this report).



**FC Connector Dimensions**



**Typical FC Connector Installation**

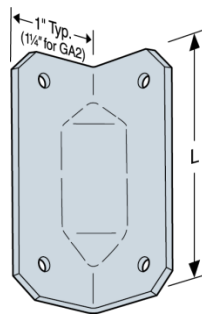
**Figure 3- FC Framing Clips**

**TABLE 4: ALLOWABLE LOADS FOR GA GUSSET ANGLES**

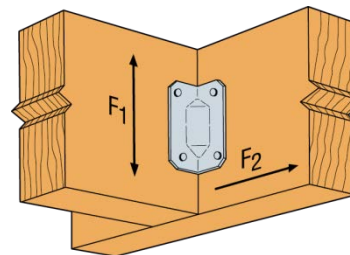
MODEL NO.	ANGLE LENGTH (L) (inches)	FASTENERS (Quantity-Type)	ALLOWABLE LOADS <sup>1</sup> (lbs)							
			$F_1$ where $C_D =$				$F_2$ where $C_D =$ <sup>3</sup>			
			1.0	1.15	1.25	$1.6^2$	1.0	1.15	1.25	$1.6^2$
GA1	$2\frac{3}{4}$	4-10d x $1\frac{1}{2}$	235	270	290	350	235	270	290	365
GA2	$3\frac{1}{4}$	6-10d x $1\frac{1}{2}$	355	405	435	550	355	405	435	550

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

1. Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
2. Allowable loads have been increased using the tabulated value of  $C_D$  for wind or earthquake loading. No further increase is allowed.
3. Connectors are required on both sides to achieve  $F_2$  loads in both directions.



**GA1**



**Typical GA Installation**

**Figure 4 – GA Gusset Angles**



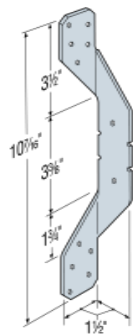
**TABLE 5: ALLOWABLE LOADS FOR H HURRICANE TIES**

MODEL NO.	FASTENERS (Quantity-Type)			ALLOWABLE LOADS <sup>1,2,3,5,6</sup> (lbs)		
				Uplift <sup>3</sup> C <sub>D</sub> =1.6	Lateral C <sub>D</sub> =1.6	
	To Rafter	To Plates	To Studs		F <sub>1</sub> <sup>4</sup>	F <sub>2</sub>
H2A	5 - 8d x 1½	2 - 8d x 1½	5 - 8d x 1½	525	130	55
H2.5T	5 - 8d	5 - 8d	-	495 <sup>7</sup>	135	145
H8	5 - 10d x 1 ½	5 - 10d x 1 ½	-	735	95	90
H10A-2	9 - 10d x 3	9 - 10d x 3	-	1,080	680	260
H10S	8 - 8d x 1½	8 - 8d x 1½	8 - 8d	910 <sup>7,8,9</sup>	660 <sup>8,9</sup>	215 <sup>8</sup>
H14	12 - 8d x 1½	1 13 - 8d	-	1,275	725	285
	12 - 8d x 1½	2 15 - 8d	-	1,340	670	230
HGA10	4 - SDS 1/4 x 1½	4 - SDS 1/4 x 3	-	650	1,165	940 <sup>10</sup>

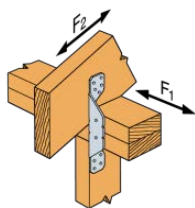
SI: 1 inch = 25.4 mm, 1 lbs = 4.45 N

- Allowable loads are for one anchor. A minimum rafter thickness of 2½ inches shall be used when framing anchors are installed on each side of the rafter and on the same side of the plate. Hurricane ties do not replace solid blocking. When installing on plated trusses (on the side opposite the truss plate) the ties shall not be fastened through the truss plate from behind. This may force the truss plate off of the truss and compromise truss performance.
- Allowable simultaneous loads in more than one direction on a single connector shall be evaluated as follows:  
Design Uplift/Allowable Uplift + Design Lateral Parallel to Plate/Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate/Allowable Lateral Perpendicular to Plate < 1.0. The number of terms considered in the equation is dependent on the designer's method of calculating wind forces and the utilization of the connector in the structural system.
- The loads have been increased for wind or earthquake loading using the tabulated value of C<sub>D</sub> with no further increase is allowed. Allowable loads shall be adjusted when other load durations govern.
- Allowable loads in the F<sub>1</sub> direction are not intended to replace diaphragm boundary members or prevent cross-grain bending of the truss or rafter members.
- When cross-grain bending or cross-grain tension is present in the members, mechanical reinforcement of the wood members to resist such loads shall be considered.
- Hurricane Ties are shown installed on the outside of the wall for clarity. Installation on the inside of the wall is acceptable. For a Continuous Load Path against uplift loads, connections in the same area (i.e. truss to plate connector and plate to stud connector) shall be on same side of the wall.
- Allowable uplift load for the H2.5T and H10S with 8dX1½ fasteners is 420 lbs and 465 lbs, respectively.
- H10S nails to plates are optional for uplift loads but required for lateral loads.
- For H10S, the stud may be offset 1 inch maximum from center of rafter for reduced uplift and F<sub>1</sub> load capacities of 890 lbs and 535 lbs, respectively.
- HGA10 F<sub>2</sub> value is for load acting toward the connector. For load away from the connector, F<sub>3</sub> = 815 lbs.

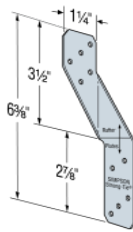




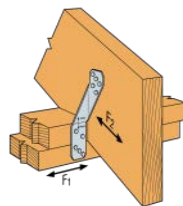
H2A



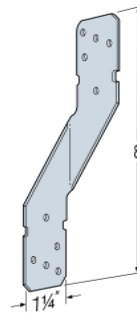
H2A Typical Installation



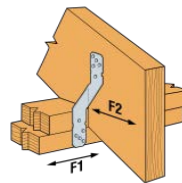
H2.5T



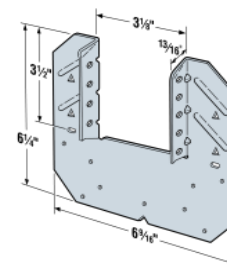
H2.5T Typical Installation



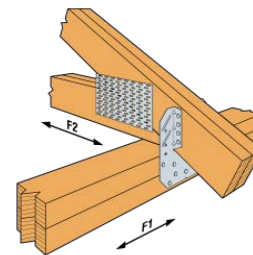
H8



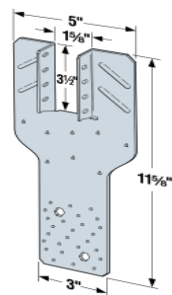
H8 Typical Installation



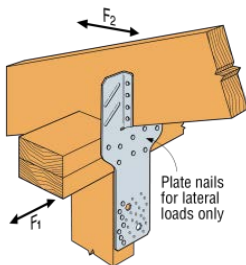
H10A-2



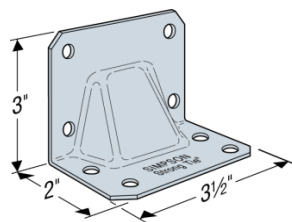
H10A-2 Typical Installation



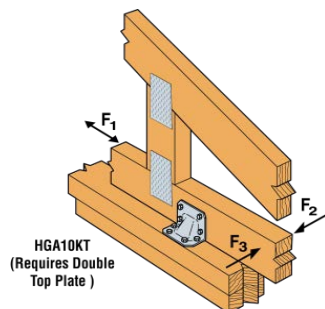
H10S



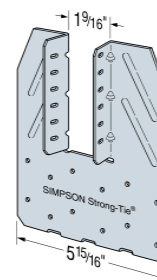
H10S Typical Installation



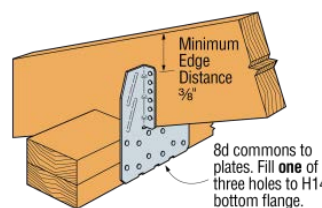
HGA10



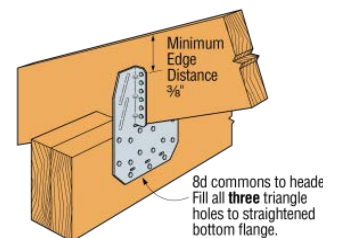
HGA10 Typical Installation



H14



H14 Typical Top Plate Installation



H14 Typical Beam Installation

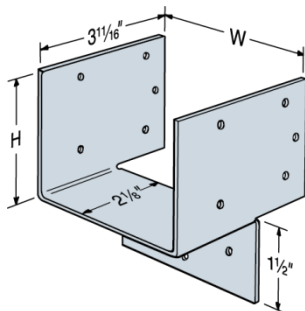
Figure 5 – H Hurricane Ties

**TABLE 6: ALLOWABLE LOADS FOR THE HH HEADER HANGERS**

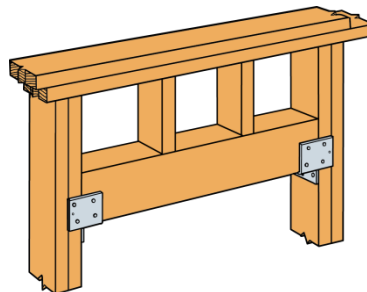
MODEL NO.	HANGER DIMENSIONS <sup>1</sup> (in)		MIN. POST SIZE	FASTENERS (Quantity-Type)		ALLOWABLE LOADS <sup>2</sup> (lbs)					
	W	H		Stud	Header	F <sub>1</sub> where C <sub>D</sub> = <sup>4</sup>			F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
						1.0	1.15	1.25			
HH4	3 <sup>1</sup> / <sub>2</sub>	2 <sup>13</sup> / <sub>16</sub>	2x	7-10dx1 <sup>1</sup> / <sub>2</sub>	4-10dx1 <sup>1</sup> / <sub>2</sub>	850	965	1,035	–	540	625
			Dbl 2x	7-16dx2 <sup>1</sup> / <sub>2</sub>	4-16dx2 <sup>1</sup> / <sub>2</sub>	1,005	1,140	1,230	–	720	965
			3x	9-16d	4-16d	1,295	1,470	1,585	675	720	965
HH6	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>8</sub>	2x	10-10dx1 <sup>1</sup> / <sub>2</sub>	6-10dx1 <sup>1</sup> / <sub>2</sub>	1,215	1,375	1,480	–	1,085	970
			Dbl 2x	10-16dx2 <sup>1</sup> / <sub>2</sub>	6-16dx2 <sup>1</sup> / <sub>2</sub>	1,440	1,630	1,760	–	1,045	1,605
			3x	12-16d	6-16d	1,725	1,955	2,110	980	1,045	1,605

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

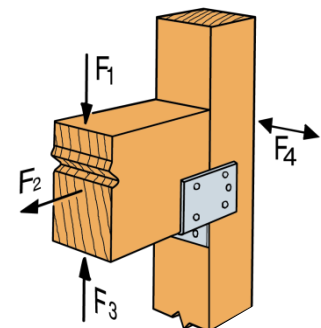
- Figure 6 of this report describes definitions of dimension nomenclature (W and H).
- Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
- Allowable loads have been increased using the tabulated value of C<sub>D</sub> for wind or earthquake loading. No further increase is allowed.
- Duration of load increase shall not exceed 1.25.



**HH4 Hanger Dimensions**



**Typical HH Installation**



**Allowable Load Directions**

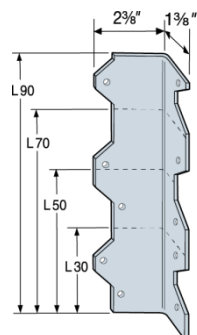
**Figure 6 – HH Header Hangers**

**TABLE 7: ALLOWABLE LOADS FOR THE L REINFORCING ANGLES**

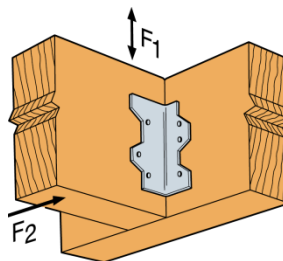
MODEL NO.	ANGLE LENGTH (L) (inches)	FASTENERS <sup>5</sup> (Quantity-Type)	ALLOWABLE LOADS <sup>1,3,4</sup> (lbs)							
			F <sub>1</sub> where C <sub>D</sub> =				F <sub>2</sub> where C <sub>D</sub> =			
			1.0	1.15	1.25	1.6 <sup>2</sup>	1.0	1.15	1.25	1.6 <sup>2</sup>
L30	3	4-10d x 1 ½	245	250	250	250	245	275	295	370
L50	5	6-10d x 1 ½	365	415	445	525	365	415	445	555
L70	7	8-10d x 1 ½	485	550	595	740	485	550	595	740
L90	9	10-10d x 1 ½	610	690	740	925	610	690	740	925

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

1. Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
2. Allowable loads have been increased for wind or earthquake loading. No further increase is allowed.
3. Minimum member thickness shall be 1¼ inches to achieve the tabulated allowable load values.
4. Connectors are required on both sides to achieve F<sub>2</sub> loads in both directions.
5. The L angle's wider leg shall be nailed into the joist to ensure tabulated loads and allow correct nailing.



**L Angle**



**Typical L50 Installation and Allowable Load Directions**

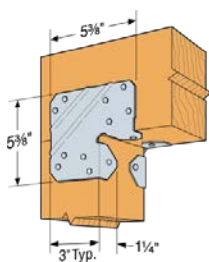
**Figure 7 – L Reinforcing Angles**

**TABLE 8: ALLOWABLE LOADS FOR LCE4 POST CAP**

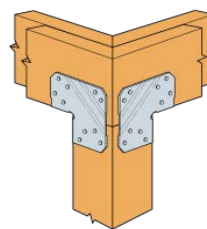
MODEL NO.	FASTENERS (Quantity-Type)		ALLOWABLE LOADS <sup>1,2</sup> (lbs)	
			Uplift <sup>3</sup>	Lateral
	Beam	Post	C <sub>D</sub> =1.60	C <sub>D</sub> =1.60
LCE4	14-16d	10-16d	1,665	1,230
LCE4 (Mitered Corner)	14-16d	10-16d	885	-

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

1. The loads have been increased using the tabulated value of C<sub>D</sub> for wind or earthquake loading, with no further increase allowed. Allowable loads shall be adjusted when other load durations govern.
2. Loads apply only when used in pairs. Loads in table above are for each connector.
3. Uplift loads do not apply to splice conditions.



**LCE4**



**LCE4**

**(Mitered Corner)**

**Figure 8 – LCE4 Post Cap**

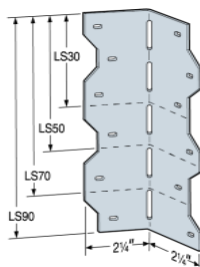


**TABLE 9: ALLOWABLE LOADS FOR LS SKEWABLE ANGLES**

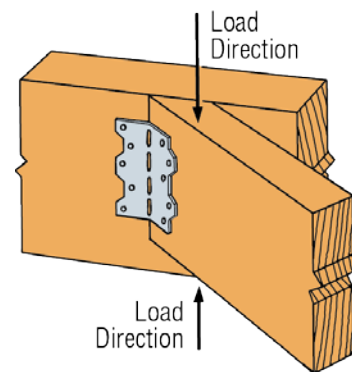
MODEL NO.	L (inches)	FASTENERS (Quantity-Type)		ALLOWABLE LOADS <sup>1,2,3</sup> (lbs)			
		Carried Member	Carrying Member	C <sub>D</sub> =1.0	C <sub>D</sub> =1.15	C <sub>D</sub> =1.25	C <sub>D</sub> =1.6
LS30	3 ¾	3-10d x 1½	3-10d x 1½	320	320	320	320
		3-10d	3-10d	355	395	395	395
LS50	4 ⅞	4-10d x 1½	4-10d x 1½	475	540	560	560
		4-10d	4-10d	475	540	580	730
LS70	6 ¾	5-10d x 1½	5-10d x 1½	590	645	645	645
		5-10d	5-10d	590	675	725	915
LS90	7 ⅞	6-10d x 1½	6-10d x 1½	710	805	870	890
		6-10d	6-10d	710	805	870	1,040

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

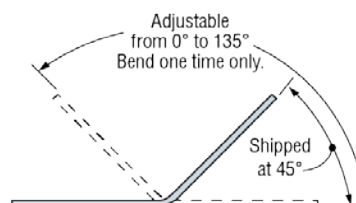
1. Tabulated allowable load capacities shall be selected based on duration of load as permitted by the applicable NDS edition.
2. Figure 9 of this report indicates load directions.
3. Joist shall be constrained against rotation (for example, with solid blocking) when using a single LS per connection.



**LS**  
**U.S. Patent**  
**4,230,416**



**LS Installed**



**LS Bend Angles**

**Figure 9 – LS Skewable Angles**

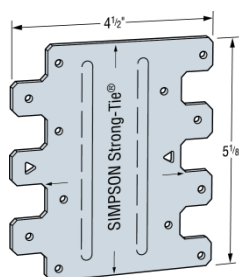


**TABLE 10: ALLOWABLE LOADS FOR LTP4 AND LTP5 LATERAL TIE PLATES**

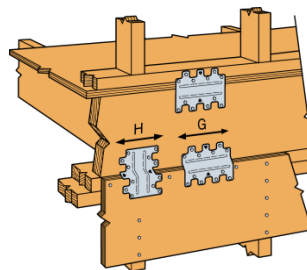
MODEL NO.	CONNECTOR CONFIGURATION	FASTENERS (Quantity-Type)		ALLOWABLE LATERAL LOADS <sup>1,3</sup> (lbs) $C_D=1.6$
		Rim Board	Plates	
LTP4	G	6-8d x 1 ½	6-8d x 1 ½	625
	H	6-8d x 1 ½	6-8d x 1 ½	525
LTP5 <sup>2</sup>	G	6-8d x 1 ½	6-8d x 1 ½	565
	H	6-8d x 1 ½	6-8d x 1 ½	490

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

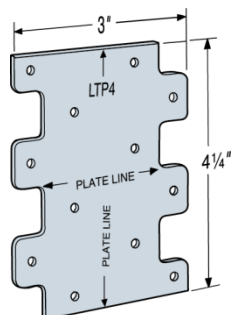
1. The loads have been increased using the tabulated value of  $C_D$  for wind or earthquake loading with no further increase allowed. Allowable loads shall be adjusted when other load durations govern.
2. The LTP5 may be installed over wood structural panel sheathing no greater than inch thick.
3. Some illustrations show connections that may cause cross-grain tension or bending of the wood during loading if not reinforced sufficiently. In this case, mechanical reinforcement should be considered.



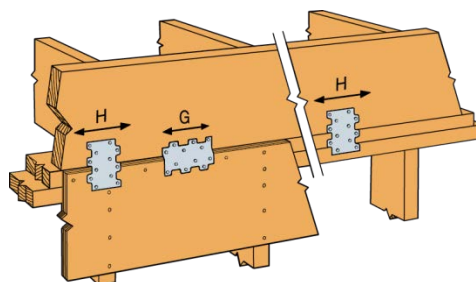
**LTP5**



**LTP5 Typical Installations**



**LTP4**



**LTP4 Typical Installations**

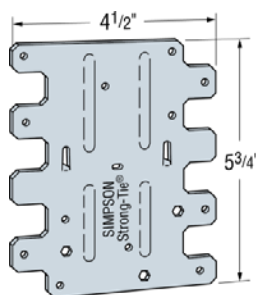
**Figure 10 – LTP4 and LTP5 Lateral Tie Plates**

**TABLE 11: ALLOWABLE LOADS FOR RBC/RBCP ROOF BOUNDARY CLIPS**

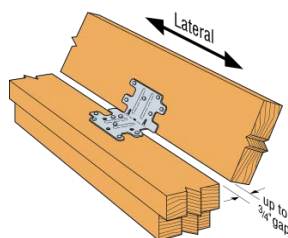
MODEL NO.	CONNECTION TYPE	BEND ANGLE <sup>4,5</sup>	FASTENERS (Quantity-Type)		ALLOWABLE LATERAL LOADS <sup>1,2,3</sup> (lbs) C <sub>D</sub> =1.6
			Plate	Blocking	
RBC	Inside	45 to 90°	6-10dx1 ½	6-10dx1 ½	445
	Outside	0 to 29°			435
		30 to 45°			465

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

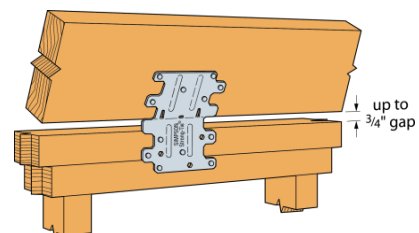
1. The loads have been increased using the tabulated value of C<sub>D</sub> for wind or earthquake loading with no further increase allowed. Allowable loads shall be adjusted when other load durations govern.
2. Allowable loads are for one clip attached to blocking minimum 1½ inch thick.
3. RBCP replaces blocking fasteners with prongs. All load values are identical. Bend holes shall be aligned along lower edge of block as shown in Figure 11 of this report. All prongs in the RBCP shall be pressed (not hammered) into the block such that there is no more than a 1/32 inch gap between the face of the block and the bottom surface of the RBCP. RBCP prongs shall be installed in clear wood (no knots, etc.).
4. RBC/RBCP is shipped flat. Bending angle is measured from initial flat orientation. For inside installation, the bend angle = 90° - roof slope. For outside installation, the bend angle = roof slope.
5. RBCP bend holes shall be aligned along lower edge of block as shown in Figure 11 of this report.



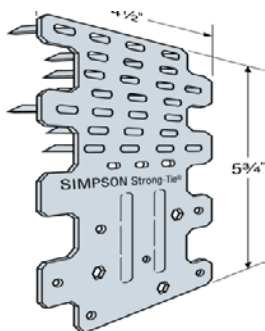
**RBC**  
U.S. Patents  
7,293,390  
7,549,262



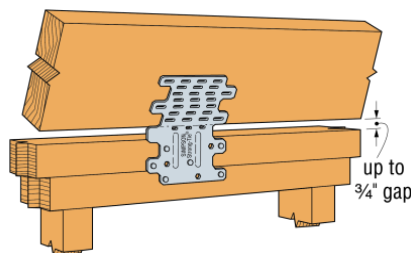
**RBC Inside Installation  
(RBCP Similar)**



**RBC Outside Installation**



**RBCP**



**RBCP Outside Installation**

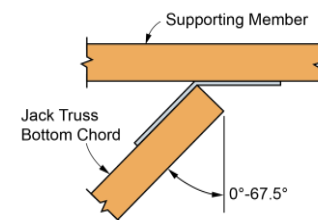
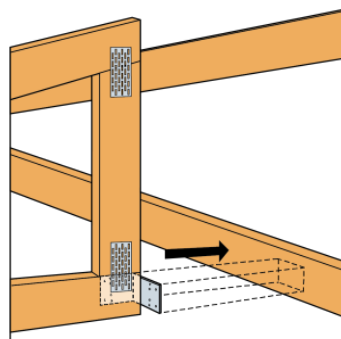
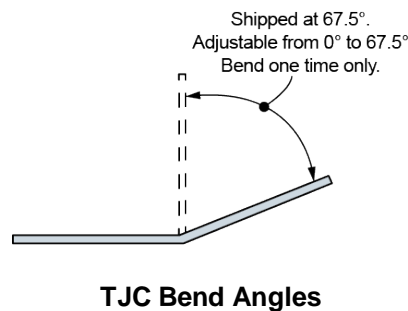
**Figure 11 – RBC and RBCP Roof Boundary Clips**

**TABLE 12: ALLOWABLE LOADS FOR TJC TRUSS JACK CONNECTOR**

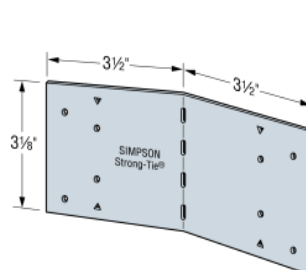
MODEL NO.	FASTENERS (Quantity-Type)		ALLOWABLE LOADS <sup>1,2,3,4</sup> Where $C_D=1.0$ ; $C_D=1.15$ ; $C_D=1.25$ ; $C_D=1.6$ (lbs.)		
	Carrying Member	Carried Member	0° Skew	1 to 60° Skew	61 to 67.5° Skew
TJC37	4-8dx1 ½	4-8dx1 ½	340	265	305
	6-8dx1 ½	6-8dx1 ½	510	425	375
TJC57	12-8dx1 ½	12-8dx1 ½	825	785	750
	12-SD9112	12-SD9112	1,120	985	995

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

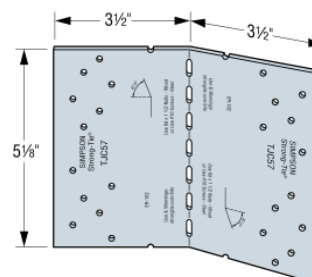
1. No load duration increase allowed.
2. Allowable loads are for vertical direction (uplift or download).
3. TJC37 and TJC57 require single-ply carried members with minimum 2x4 and 2x6 chord members, respectively.
4. Back-to-back installation on a single-ply girder/hip member is outside the scope of this report. To reduce the potential for splitting, the TJC shall be installed with a minimum 3/16 inch edge distance on the chord members.



**TJC Typical Installation**



**TJC37**



**TJC57**

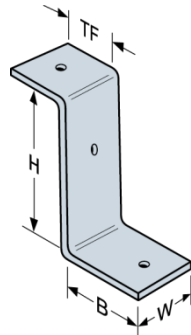
**Figure 12 – TJC Truss Jack Connector**

**TABLE 13: ALLOWABLE LOADS FOR Z PANEL STIFFENER CLIPS**

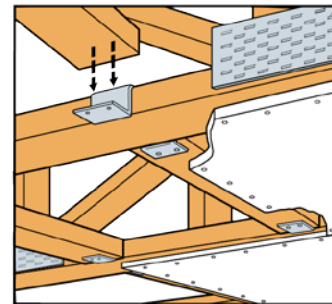
MODEL NO.	CLIP DIMENSIONS <sup>1</sup> (in)				FASTENERS (Quantity-Type)		ALLOWABLE DOWNLOAD <sup>2,3</sup> Where C <sub>D</sub> =1.0 C <sub>D</sub> =1.15 C <sub>D</sub> =1.25 C <sub>D</sub> =1.6 (lbs.)
	W	H	B	TF	Top	Seat	
Z2	2 <sup>5</sup> / <sub>16</sub>	1 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	2-10d x 1 <sup>1</sup> / <sub>2</sub>	2-10d x 1 <sup>1</sup> / <sub>2</sub>	420
Z4	1 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1-16d	1-16d	420
Z44	2 <sup>1</sup> / <sub>2</sub>	3 <sup>1</sup> / <sub>2</sub>	2	1 <sup>3</sup> / <sub>8</sub>	2-16d	2-16d	775

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

- Figure 13 of this report provides definitions of clip dimension nomenclature (W, H, B, TF).
- No load duration increase permitted.
- Compression perpendicular-to-grain capacity for the joists bearing on the clips shall be verified in accordance with the applicable NDS edition and shall not exceed the allowable loads noted in the table.



**Z**



**Typical Z Clip Installation**

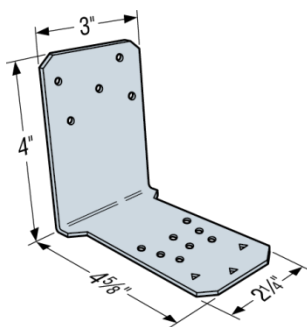
**Figure 13 – Z Panel Stiffener Clips**

**TABLE 14: ALLOWABLE LOADS FOR FWANZ FOUNDATION WALL ANGLES**

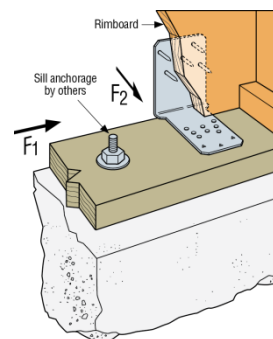
Model No.	Sill Plate	Fastener (Quantity-Type)		Rim Board Material	Allowable $F_2$ Load		
		Sill Plate	Rim Board		$C_D = 0.90$	$C_D = 1.00$	$C_D = 1.60$
FWANZ	2x4, 3x4, 2-2x4, 4x4	(8) 10d x 1½	(5) 10d x 1½	1" OSB	750	750	750
				1½" OSB	815	815	815
				1¾" I-Joist	940	1,045	1,070
				1¼" LSL	940	1,045	1,105
				2x DF/SP	940	1,045	1,390
				1¾" LVL	940	1,045	1,245
	2x6, 3x6, 2-2x6, 4x6	(11) 10d x 1½	(5) 10d x 1½	1" OSB	750	750	750
				1½" OSB	935	935	935
				1¾" I-Joist	955	955	955
				1¼" LSL	1,025	1,025	1,025
				2x DF/SP	1,295	1,440	1,445
				1¾" LVL	1,295	1,385	1,385

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

1. Tabulated allowable loads shall be selected based on duration of load as permitted by the applicable NDS edition.
2. FWANZ lateral  $F_1$  load is equal to 260 lbs. No further increase in load permitted.
3. For simultaneous  $F_1$  and  $F_2$  loads, the connector shall be evaluated as follows: Design Lateral Parallel to Plate/Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate/Allowable Lateral Perpendicular to Plate  $\leq 1.0$ . The number of terms in the equation is dependent on the utilization of the connector in the structural system.
4. For joist/blocking spacing up to 16 inches on center FWANZ shall be centered between joists/blocking. For joist/blocking spacing greater than 16 inches on center but not exceeding 48 inches on center. The FWANZ shall be located within 4 inches of the adjacent joist/blocking.
5. Splice joint not permitted on rim board in same bay as FWANZ unless blocking is placed on both sides of the splice joint.
6. When floor joists are parallel to the rimboard, the structural design professional shall ensure proper load transfer from rimboard into the diaphragm.
7. When I-joist rim material is used, backer blocks shall be used and installed according to the I-Joist manufacturer's instructions.



**FWANZ**



**Typical Installation and Allowable Load Direction**

**Figure 14 – FWANZ Foundation Wall Angles**