

CH Machine Connectors

Installation Instructions

1 Installation

- 1.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, TER 2104-02 and the applicable building code.
- 1.2 In the event of a conflict between the manufacturer installation instructions and TER 2104-02, the more restrictive shall govern.
- 1.3 Connectors shall be attached to framing using the fasteners as specified in the applicable table in Section 2.
- 1.4 Surfaces of the connector shall be installed flush against the substrate or structural member.

2 Applications

2.1 *General*

- 2.1.1 CH Machine connectors are used to resist uplift, lateral, and/or gravity loads imposed on different connections in light-frame construction.
- 2.1.2 Allowable loads for CH Machine connectors were derived using testing and calculations in accordance with ASTM D7147 per IBC Section 2303.5, IBC Section 2304.10.4 and IRC Section R301.1.3.
- 2.1.3 The Registered Design Professional for the project shall determine which type of connector is appropriate using the tables in this section.
- 2.1.4 Tabulated allowable loads apply to wood used in dry conditions and where sustained temperatures are 100°F.
 - 2.1.4.1 When connectors are installed in conditions exposed to temperatures exceeding 100°F, the allowable loads shall be adjusted by the applicable temperature factor (C_t) specified in NDS.
 - 2.1.4.2 When connectors are installed in wood having a moisture content of greater than nineteen percent (19%), sixteen percent (16%) for engineered wood products, or where wet service conditions are expected over the life of the connector, the allowable loads must be adjusted by the wet service factor (C_M) specified in NDS.

2.2 Tie Clip Connectors

2.2.1 Allowable loads and fastener schedules for tie clips (CH01, CH01-02, CH02, CH09, and CH11) are provided in Table 1.

Table 1. Allowable Loads and Fastener Schedules for Tie Clip Connectors

Part Number	Minimum Gauge Thickness (in)	Load Orientation	Fasteners				Allowable Loads ^{7,8} (lb)					
			Top Plate		Truss/Rafter		Wood Species (Specific Gravity)					
							SP (0.55)		DF-L (0.50)		HF/SPF (0.42)	
			Screw	Qty	Screw	Qty	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
CH01	0.045 (18-gauge)	Uplift ¹	#8 x 1 1/4"	5	#8 x 1 1/4"	5	505	680	470	630	405	540
		Lateral – F1 ²					430	455	355	360	220	230
		Lateral – F2 ²					260	260	205	205	135	135
CH01-02	0.045 (18-gauge)	Uplift ¹	#8 x 1 1/4"	2	#8 x 1 1/4"	2	200	270	190	250	160	215
		Lateral – F1 ²					170	180	135	145	90	90
		Lateral – F2 ²					105	105	80	80	55	55
CH02	0.045 (18-gauge)	Uplift ³	#8 x 1 1/4"	5	#8 x 1 1/4"	5	400	400	400	400	350	350
		Lateral – F1 ⁴					640	640	505	505	325	325
		Lateral – F2 ⁴					750	750	630	630	410	410
CH09 ⁽⁶⁾	0.060 (16-gauge)	Uplift ¹	#8 x 1 1/4"	6	#8 x 1 1/4"	6	630	935	580	870	505	755
		Lateral – F1 ⁵					175	175	140	140	90	90
		Lateral – F2 ⁵					185	185	145	145	95	95
CH11 ⁽⁶⁾	0.060 (16-gauge)	Uplift ¹	#8 x 1 1/4"	6	#8 x 1 1/4"	6	630	935	580	870	505	755
		Lateral – F1 ⁵					175	175	140	140	90	90
		Lateral – F2 ⁵					185	185	145	145	95	95

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

- Uplift loads shown are for a single connector. Where two connectors are used, the tabulated loads may be doubled.
- CH01 and CH01-02 must be installed in pairs to achieve tabulated F1 and F2 loads. See Figure 1 for more detail.
- Uplift loads shown are for a single connector. Where two or four connectors are used, the tabulated loads may be doubled or quadrupled, respectively.
- CH02 must be installed in two pairs (four (4) connectors total) to achieve tabulated F1 and F2 loads. See Figure 1 for more detail.
- CH09 and CH11 must be installed in pairs to achieve tabulated F1 and F2 loads.
- Only six nails are required on each side of the CH09 and CH11 to obtain tabulated loads. Nails shall be placed in the six holes closest to the twist in the connector (i.e., the bottom six holes on the truss/rafter and the top six holes on the top plate).
- The tabulated loads are valid for clips installed on the inside or the outside of the wall. However, to maintain a continuous load path for uplift connections in close proximity to one another, such as truss-to-plate and plate-to-stud, clips should be installed on the same side of the wall.
- Allowable loads shall be selected based on the load duration as permitted by the applicable building code.

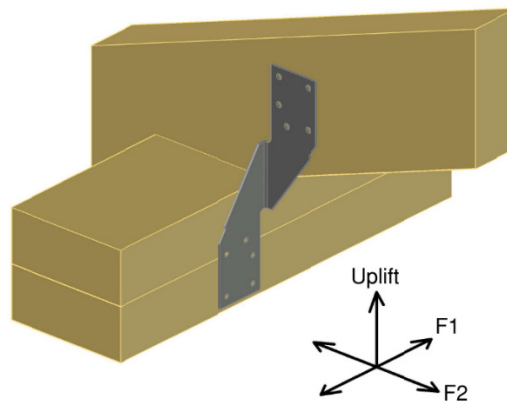


Figure 1. Tie Clip Load Orientations

2.3 Angle Connectors

2.3.1 Allowable loads and fastener schedules for CH10 are provided in Table 2.

Table 2. Allowable Loads and Fastener Schedule for Angle Connectors

Part Number	Minimum Gauge Thickness (in)	Load Orientation ³	Fasteners				Allowable Loads ^{1,2} (lb)					
							Wood Species (Specific Gravity)					
			Plate		Stud		SP (0.55)		DF-L (0.50)		HF/SPF (0.42)	
			Nail	Qty	Nail	Qty	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
CH10	0.045 (18-gauge)	Lateral – F1	0.148" x 1 1/2"	4	0.148" x 1 1/2"	4	425	425	370	370	240	240
		Lateral – F2					525	525	485	485	420	420

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

- Two CH10 connectors (one on each side of stud) are required to achieve tabulated allowable loads.
- Allowable loads shall be selected based on the load duration as permitted by the applicable building code.
- F1 direction is parallel to wall line. F2 direction is perpendicular to wall line. See Figure 2 for more detail.

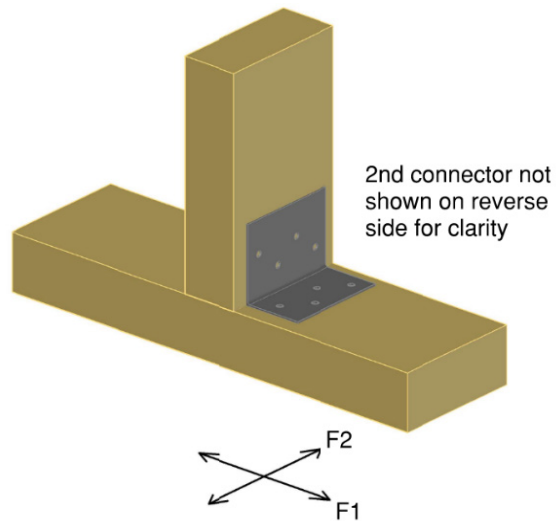


Figure 2. Angle Connector Load Orientations

2.4 Face Mount Joist Hangers

2.4.1 Allowable loads and fastener schedules for face mount joist hangers (CH12, CH12B, CH13, CH13B, CH14, and CH14B) are provided in Table 3.

Table 3. Allowable Loads and Fastener Schedules for Face Mount Joist Hangers

Part No.	Minimum Gauge Thickness (in)	Fasteners				Allowable Loads ¹ (lb)											
						Wood Species (Specific Gravity)											
						SP (0.55)				DF-L (0.50)				HF/SPF (0.42)			
						Load Duration Factor, C _D											
		Joist		Header		Gravity		Up ²		Gravity		Up ²		Gravity		Up ²	
Nail	Qty	Nail	Qty	1.0	1.15	1.25	1.6	1.0	1.15	1.25	1.6	1.0	1.15	1.25	1.6		
CH12	0.034 (20-gauge)	0.131" x 1½"	4	0.131" x 1½"	6	620	710	725	660	570	655	670	610	490	505	505	525
CH12B	0.045 (18-gauge)		4		6	625	710	725	670	580	655	670	620	490	505	505	535
CH13	0.034 (20-gauge)		6		10	955	1,000	1,010	990	850	895	900	915	680	690	690	790
CH13B	0.045 (18-gauge)		6		10	1,045	1,140	1,145	1,005	965	1,015	1,020	930	775	780	780	800
CH14	0.034 (20-gauge)		8		14	1,290	1,290	1,290	1,320	1,130	1,130	1,130	1,220	870	870	870	1,050
CH14B	0.045 (18-gauge)		8		14	1,465	1,565	1,565	1,340	1,350	1,370	1,370	1,235	1,055	1,055	1,055	1,065
SI: 1 in = 25.4 mm, 1 lb = 4.45 N																	
1. Allowable loads shall be selected based on the load duration as permitted by the applicable building code.																	
2. Allowable uplift (Up) loads are for wind or earthquake loading (CD=1.6) and no further increases are allowed. The allowable uplift load shall be reduced where other load durations govern.																	

2.5 Hurricane and Seismic Tie Connectors

2.5.1 Allowable loads and fastener schedules for CH21 and CH26 are provided in Table 4.

Table 4. Allowable Loads and Fastener Schedules for Hurricane and Seismic Tie Connectors

Part No.	Minimum Gauge Thickness (in)	Load Orientation	Fasteners				Allowable Loads ³ (lb)					
							Wood Species (Specific Gravity)					
			Top Plates		Truss/Rafter		SP (0.55)		DF-L (0.50)		HF/SPF (0.42)	
			Nail	Qty	Nail	Qty	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
CH21	0.045 (18-gauge)	Uplift	0.131" x 2 1/2"	4	0.131" x 1 1/2"	5	420	500	390	460	335	400
		Lateral – F1 ¹					315	330	275	275	175	175
		Lateral – F2 ²					165	165	155	155	105	105
CH26	0.045 (18-gauge)	Uplift	0.131" x 2 1/2"	8	0.131" x 1 1/2"	8	765	765	710	710	610	610
		Lateral – F1 ¹					590	590	545	545	455	455
		Lateral – F2 ²					650	650	600	600	500	500

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Loading in the F1 direction indicate shear forces parallel to the plane of the wall, one side of the connection to the truss/rafter in withdrawal. See Figure 3 for more detail.
2. Loading in the F2 direction indicate shear forces perpendicular to the plane of the wall, connection to top plate in withdrawal. See Figure 4 for more detail.
3. Allowable loads shall be selected based on the load duration as permitted by the applicable building code.

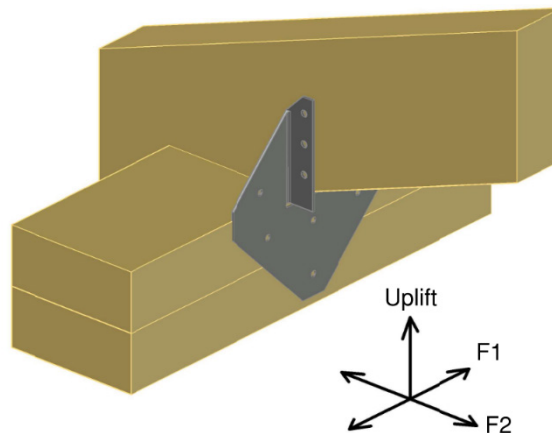


Figure 3. CH21 Load Orientations

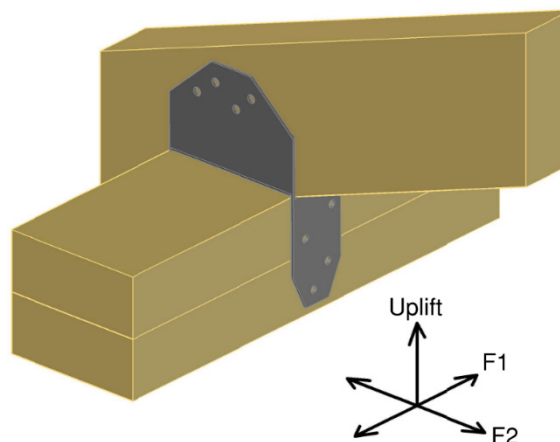


Figure 4. CH26 Load Orientations

2.6 Post Cap/Base Connectors

2.6.1 Allowable loads and fastener schedules for post cap/base connections (CH22 and CH25) are provided in Table 5.

Table 5. Allowable Loads and Fastener Schedules for Post Cap/Base Connectors

Part No.	Minimum Gauge Thickness (in)	Load Orientation ²	Fasteners				Allowable Loads ¹ (lb)					
							Wood Species (Specific Gravity)					
			Post		Substrate		SP (0.55)		DF-L (0.50)		HF/SPF (0.42)	
			Nail	Qty	Nail	Qty	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
CH22	0.045 (18-gauge)	Uplift	0.162" x 3 1/2"	8	0.162" x 3 1/2"	4	660	715	520	630	335	410
		Lateral – F1					600	810	555	810	480	765
		Lateral – F2					600	830	555	830	480	755
CH25	0.045 (18-gauge)	Uplift	0.162" x 3 1/2"	8	0.162" x 3 1/2"	4	555	555	490	490	320	320
		Lateral – F1					600	720	555	665	480	570
		Lateral – F2					600	745	555	745	480	675

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

4. Allowable loads shall be selected based on the load duration as permitted by the applicable building code.

5. F1 direction is parallel to substrate member. F2 direction is perpendicular to substrate member. See Figure 5 for more detail.

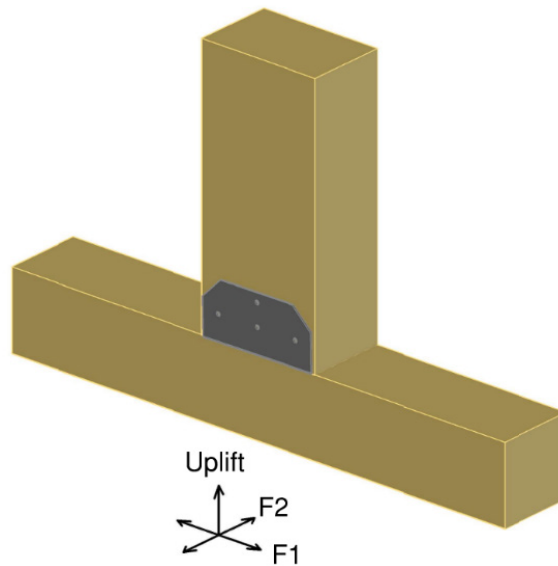


Figure 5. Post Cap/Base Load Orientations

2.7 Tension Strap Connectors

2.7.1 Allowable loads and fastener schedules for tension straps (CH27A and CH27B) are provided in Table 6.

Table 6. Allowable Tension Loads and Fastener Schedules for Tension Strap Connectors

Part No.	Minimum Gauge Thickness (in)	Strap Length (in)	Number of Nails Each End of Strap		Allowable Tension Loads ^{1,2} (lb)					
					Wood Species (Specific Gravity)					
					SP (0.55)		DF-L (0.50)		HF/SPF (0.42)	
			Type	Qty	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
CH27A	0.034 (20-gauge)	9	0.148" x 2 1/2"	4	500	680	460	630	395	540
		12		5	620	740	575	680	495	585
		18		7	620	740	575	680	495	585
		24		9	620	740	575	680	495	585
		30		11	620	740	575	680	495	585
CH27B	0.045 (18-gauge)	9	0.148" x 2 1/2"	4	505	755	465	695	400	600
		12		5	630	880	580	815	500	705
		18		7	630	880	580	815	500	705
		24		9	630	880	580	815	500	705
		30		11	630	880	580	815	500	705
SI: 1 in = 25.4 mm, 1 lb = 4.45 N										
1. CH27A and CH27B steel straps are only rated to resist tension loads and are not rated for compression or lateral loads.										
2. Allowable loads shall be selected based on the load duration as permitted by the applicable building code.										