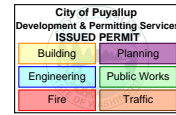


# BSE

Brien Structural Engineers, P.S.

PRCTI20260575



Centeris Voltage Park "Row D"  
1023 39th Avenue South East  
Puyallup, WA 98374

Interior Framing  
Structural Calculations



Project Number 26209  
April 15, 2026

## DESIGN LOADS

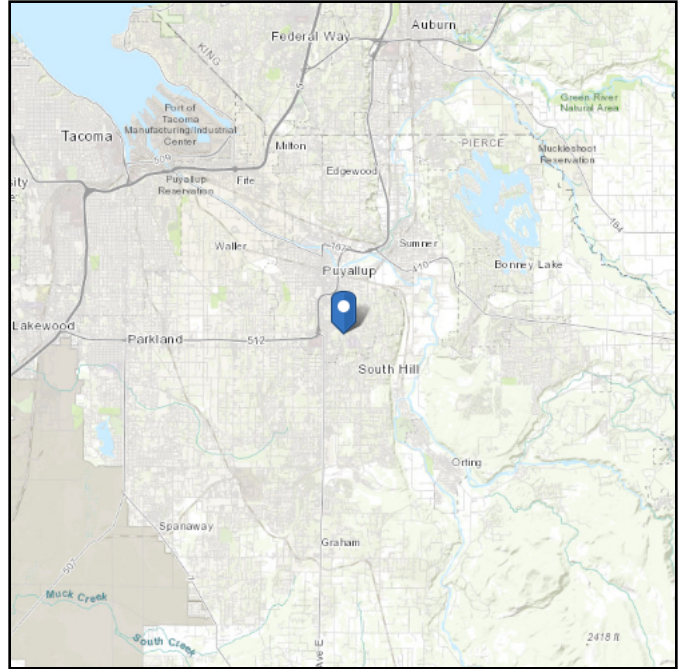
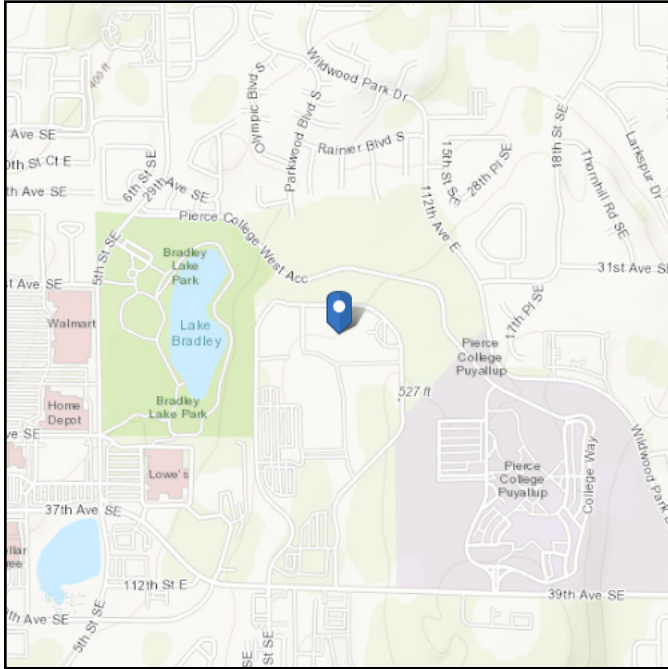


# ASCE Hazards Report

**Address:**  
1023 39th Ave SE  
Puyallup, Washington  
98374

**Standard:** ASCE/SEI 7-16  
**Risk Category:** II  
**Soil Class:** D - Default (see Section 11.4.3)

**Latitude:** 47.160892  
**Longitude:** -122.279206  
**Elevation:** 483.2088695178014 ft (NAVD 88)



**Site Soil Class:** D - Default (see Section 11.4.3)

**Results:**

$S_s$ :	1.257	$S_{D1}$ :	N/A
$S_1$ :	0.434	$T_L$ :	6
$F_a$ :	1.2	PGA :	0.5
$F_v$ :	N/A	PGA <sub>M</sub> :	0.6
$S_{MS}$ :	1.509	$F_{PGA}$ :	1.2
$S_{M1}$ :	N/A	$I_e$ :	1
$S_{DS}$ :	1.006	$C_v$ :	1.351

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

**Data Accessed:** Tue Apr 14 2026

**Date Source:** [USGS Seismic Design Maps](#)

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# BSE

B rienen S tructural E ngineers, P.S.

## Seismic Forces

Wall Type:

### Wall Seismic Weight, W

**PSF**

- Metal Stud Framing
- 5/8" Gypsum Wall Board   
(Multiply weight by actual layers of GWB.)
- 3/4" Plywood
- Cable Tray

Wall Total = 5.4 PSF  
Ceiling Total = 35.2 PSF

### Wall & Fastener Seismic Force

$$a_p = \frac{1}{1.006} \quad R_p = \frac{2.5}{1} \quad z/h = 0.75$$

$$F_d = \frac{0.4a_p S_{DS} W I_p}{R_p} \left( 1 + 2 \frac{z}{h} \right)$$

$$F_d = 0.402W \quad (\text{LRFD})$$
$$E_{ASD} = 0.7F_d = 0.282W \quad (\text{ASD})$$

ASD Seismic Force  
Wall = 1.5 PSF  
Ceiling = 9.9 PSF

**BSE**

Project: \_\_\_\_\_

Date: \_\_\_\_\_

**B**rienen **S**tructural **E**ngineers, P.S.

ANCHOR &  
CONNECTOR DESIGN

## Track Connection Distances - Based on Connector Capacities

For 5.0 psf (Live Load)

Max Considered Height

21.50 ft    Track Demand =                       $(Ht)/2 * 5psf = 53.8$     plf

Connecting Material	Concrete	MIN SHOTPIN CAPACITY $v = 120$ lbs/anchor    spacing $\leq 26.8$ in $\varnothing 1/4" \times 1-7/8"$ KH-EZ $v = 470$ lbs/anchor    spacing $\leq 36.0$ in
	Concrete on Metal Deck	MIN SHOTPIN CAPACITY $v = 215$ lbs/anchor    spacing $\leq 36.0$ in $\varnothing 1/4" \times 1-7/8"$ KH-EZ $v = 453$ lbs/anchor    spacing $\leq 36.0$ in
	27mil Steel	MIN SHOTPIN CAPACITY $v = 89$ lbs/anchor    spacing $\leq 19.9$ in
	Steel (3/16" Min)	MIN SHOTPIN CAPACITY $v = 230$ lbs/anchor    spacing $\leq 36.0$ in

For Seismic

Max Considered Height

21.50 ft    Track Demand =                      RISA-3D = 77.4    plf

Connecting Material	Concrete	MIN SHOTPIN CAPACITY $v = 90$ lbs/anchor    spacing $\leq 14.0$ in $\varnothing 1/4" \times 1-7/8"$ KH-EZ $v = 315$ lbs/anchor    spacing $\leq 36.0$ in
	Concrete on Metal Deck	MIN SHOTPIN CAPACITY $v = 90$ lbs/anchor    spacing $\leq 14.0$ in $\varnothing 1/4" \times 1-7/8"$ KH-EZ $v = 380$ lbs/anchor    spacing $\leq 36.0$ in
	27mil Steel	MIN SHOTPIN CAPACITY $v = 89$ lbs/anchor    spacing $\leq 13.8$ in
	Steel (3/16" Min)	MIN SHOTPIN CAPACITY $v = 230$ lbs/anchor    spacing $\leq 35.7$ in

## Screw Capacities

### Table Notes

- Capacities based on AISI S100 Section E4.
- When connecting materials of different steel thicknesses or tensile strengths, use the lowest values. Tabulated values assume two sheets of equal thickness are connected.
- Capacities are based on Allowable Strength Design (ASD) and include safety factor of 3.0.
- Where multiple fasteners are used, screws are assumed to have a center-to-center spacing of at least 3 times the nominal diameter (d).
- Screws are assumed to have a center-of-screw to edge-of-steel dimension of at least 1.5 times the nominal diameter (d) of the screw.
- Pull-out capacity is based on the lesser of pull-out capacity in sheet closest to screw tip or tension strength of screw.
- Pull-over capacity is based on the lesser of pull-over capacity for sheet closest to screw header or tension strength of screw.
- Values are for pure shear or tension loads. See AISI Section E4.5 for combined shear and pull-over.
- Screw Shear (Pss), tension (Pts), diameter, and head diameter are from CFSEI Tech Note (F701-12).
- Screw shear strength is the average value, and tension strength is the lowest value listed in CFSEI Tech Note (F701-12).
- Higher values for screw strength (Pss, Pts), may be obtained by specifying screws from a specific manufacturer.

### Allowable Screw Connection Capacity (lbs)

Thickness (Mils)	Design Thickness	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs)			#8 Screw (Pss = 1278 lbs, Pts = 586 lbs)			#10 Screw (Pss = 1644 lbs, Pts = 1158 lbs)			#12 Screw (Pss = 2330 lbs, Pts = 2325 lbs)			¼" Screw (Pss = 3048 lbs, Pts = 3201 lbs)		
				0.138" dia, 0.272" Head			0.164" dia, 0.272" Head			0.190" dia, 0.340" Head			0.216" dia, 0.340" Head			0.250" dia, 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
18	0.0188	33	33	44	24	84	48	29	84	52	33	105	55	38	105	60	44	127
27	0.0283	33	33	82	37	127	89	43	127	96	50	159	102	57	159	110	66	191
30	0.0312	33	33	95	40	140	103	48	140	111	55	175	118	63	175	127	73	211
33	0.0346	33	45	151	61	140	164	72	195	177	84	265	188	95	265	203	110	318
43	0.0451	33	45	214	79	140	244	94	195	263	109	345	280	124	345	302	144	415
54	0.0566	33	45	214	100	140	344	118	195	370	137	386	394	156	433	424	180	521
68	0.0713	33	45	214	125	140	426	149	195	523	173	386	557	196	545	600	227	656
97	0.1017	33	45	214	140	140	426	195	195	548	246	386	777	280	775	1,016	324	936
118	0.1242	33	45	214	140	140	426	195	195	548	301	386	777	342	775	1,016	396	1,067
54	0.0566	50	65	214	140	140	426	171	195	534	198	386	569	225	625	613	261	752
68	0.0713	50	65	214	140	140	426	195	195	548	249	386	777	284	775	866	328	948
97	0.1017	50	65	214	140	140	426	195	195	548	356	386	777	405	775	1,016	468	1,067
118	0.1242	50	65	214	140	140	426	195	195	548	386	386	777	494	775	1,016	572	1,067

### SUPREME Allowable Screw Connection Capacity (Pounds Per Screw)

Thickness (mil)	Design Thickness (in)	Fy Yield (ksi)	Fu Tensile (ksi)	#6 Screw (Pss = 643 lbs, Pts = 419 lbs)			#8 Screw (Pss = 1278 lbs, Pts = 586 lbs)			#10 Screw (Pss = 1644 lbs, Pts = 1158 lbs)			#12 Screw (Pss = 2330 lbs, Pts = 2325 lbs)			¼" Screw (Pss = 3048 lbs, Pts = 3201 lbs)		
				0.138" Dia; 0.272" Head			0.164" Dia; 0.272" Head			0.190" Dia; 0.340" Head			0.216" Dia; 0.340" Head			0.250" Dia; 0.409" Head		
				Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over	Shear	Pull-Out	Pull-Over
D25	0.0155	50	65	111	39	137	111	47	137	111	54	171	-	-	-	-	-	-
D20	0.0188	57	65	142 <sup>1</sup>	48	140	150 <sup>1</sup>	57	166	164 <sup>1</sup>	66	208	109	75	208	-	-	-
30EQD	0.0235	57	65	174 <sup>1</sup>	60	140	184 <sup>1</sup>	71	195	236 <sup>1</sup>	82	260	152	93	260	-	-	-
33EQD	0.0235	57	65	174 <sup>1</sup>	60	140	184 <sup>1</sup>	71	195	236 <sup>1</sup>	82	260	152	93	260	-	-	-
33EQS	0.0295	57	65	171	75	140	187	89	195	201	103	326	214	117	326	231	136	392
43EQS	0.0400	57	65	270	102	140	295	121	195	317	140	386	338	159	442	364	184	532

<sup>1</sup>Values are based on testing using AISI S100 procedures.

**SHEET METAL SCREW (SMS) ALLOWABLE STRENGTHS**

**TABLE 1**

**SHEET METAL SCREW ALLOWABLE STRENGTHS FOR STEEL TO STEEL CONNECTIONS.**

FASTENER SIZE											
F <sub>y</sub> (KSI)	MIL (STEEL GA)	NO. 14		NO. 12		NO. 10		NO. 8		NO. 6	
		0.250 IN		0.216 IN		0.190 IN		0.164 IN		0.138 IN	
		SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)
50	97 (12)	704	275	525	205						
	68 (14)	704	275	525	205	405	159				
	54 (16)	613	261	525	205	405	159	303	118		
33	43 (18)	302	144	280	124	263	109	244	94	165	79
	33 (20)					177	84	164	72	151	61

**NOTES:**

- SEE GENERAL NOTES ON ST1.06 FOR MORE INFORMATION.
- WHERE ONE OR TWO LAYERS OF GYP BOARD OCCURS BETWEEN STEEL SURFACES, THE ALLOWABLE VALUES OF TABLE 2 & 3 SHALL BE USED.
- ALLOWABLE STRENGTH VALUES DO NOT ACCOUNT FOR EFFECTS FROM PRYING. THE RDP IN RESPONSIBLE CHARGE OF THE PROJECT SHALL PROVIDE ADEQUATE BLOCKING/RESTRAINT TO PREVENT PRYING ACTION. WHERE PRYING OCCURS, THE VALUES AND CONSTRAINTS OF TABLE 4 SHALL BE USED.

**TABLE 2 - NON-PRYING CONDITION**

**SHEET METAL SCREW ALLOWABLE STRENGTHS FOR STEEL TO STEEL CONNECTIONS WITH ONE LAYER OF 5/8" GYP BOARD BETWEEN STEEL SURFACES.**

FASTENER SIZE											
F <sub>y</sub> (KSI)	MIL (STEEL GA)	NO. 14		NO. 12		NO. 10		NO. 8		NO. 6	
		0.250 IN		0.216 IN		0.190 IN		0.164 IN		0.138 IN	
		SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)	SHEAR (LB)	TENSION (LB)
50	97 (12)	226	275	180	205						
	68 (14)	226	275	180	205	140	159				
	54 (16)	226	261	180	205	140	159	120	118		
33	43 (18)	226	144	180	124	140	109	120	94	60	79
	33 (20)					100	84	80	72	60	61

**NOTES:**

- SEE GENERAL NOTES ON ST1.06 FOR MORE INFORMATION.
- ALLOWABLE STRENGTH VALUES DO NOT ACCOUNT FOR EFFECTS FROM PRYING. RDP IN RESPONSIBLE CHARGE TO PROVIDE ADEQUATE BLOCKING/RESTRAINT TO PREVENT PRYING ACTION. WHERE PRYING OCCURS, THE VALUES AND CONSTRAINTS OF TABLE 4 SHALL BE USED.

SECTION TITLE:

**STANDARD PARTITION WALL DETAILS**

SHEET TITLE:

**SHEET METAL SCREW ALLOWABLE STRENGTHS**

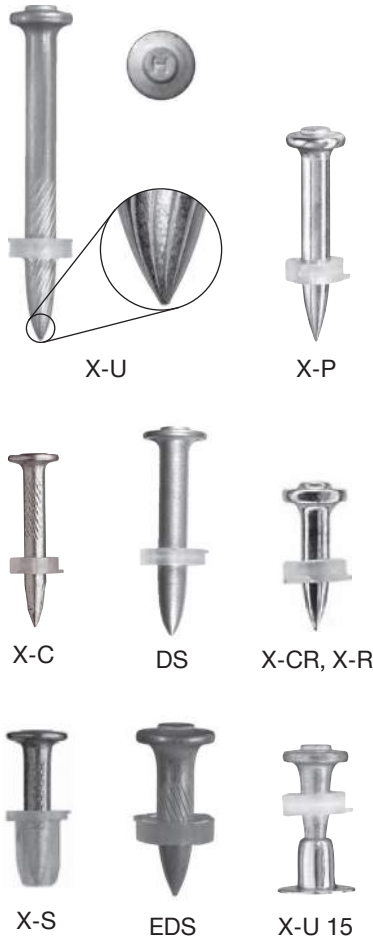
OPD NO.:

**ST1.07**

3.2.5.1	Product description
3.2.5.2	Material specifications
3.2.5.3	Technical data
3.2.5.4	Ordering information

## 3.2.5 GENERAL APPLICATION FASTENERS

### 3.2.5.1 PRODUCT DESCRIPTION



**X-U Universal Series** This universal high performance fastener is designed for applications in concrete and high strength or standard strength steel. The shank diameter is consistent through the fastener offering at 0.157". X-U fastener lengths range from 5/8" through 2-7/8" and are available as single fasteners (P8) or collated (MX) in strips of 10. All X-U fasteners have a unique twist knurling reaching 7/8" from the tip up the shank.

**X-P Premium Concrete Fastener** The X-P fastener is optimized for high performance in concrete base materials. With a shank diameter of 0.157", an optimized conical tip design, and high steel hardness, the X-P is designed for demanding concrete applications, in base materials up to 8,000 psi in strength. The X-P fastener is available in lengths ranging from 5/8" to 1-9/16", making it ideal for drywall track to concrete applications. X-P fasteners are available as single fasteners (P8) or collated (MX) in strips of 10.

**X-C Standard Series** The X-C series of fasteners is a cost effective solution for applications in concrete and masonry. This fastener is not suited for fastening to steel base materials. Fastener lengths range from 3/4" through 2-7/8" with a shank diameter of 0.138". X-C fasteners are offered in a single (P8) fastener version as well as in collated (MX) strips of 10.

**X-CR and X-R Fastener Series** The X-CR is a high performance, corrosion resistant fastener equivalent to SAE 316 stainless steel. This fastener is ideally suited for applications where corrosion is a concern whether on concrete or steel base materials. The X-CR is designed mainly for concrete applications and is offered as a single (P8) fastener in lengths from 5/8" through 2-1/8". The X-R fastener is intended for steel applications and is offered in 1/2" shank length. Shank diameter for these fasteners is 0.145" for shank lengths less than 1-1/2" and 0.157" for longer fasteners.

**X-S Steel Fastener** The X-S is an economical fastener for steel. It has a 0.145" smooth shank diameter and is offered in a 1/2" and 5/8" length. The X-S13 comes collated (MX) in strips of 10 or individually with a plastic "tophat" (THP). The X-S16 comes singly with a metal "tophat" (TH). This fastener is ideally suited for fastening drywall track to standard strength steel and is discussed further in Section 3.2.9.

**X-C G2/G3/B3, X-P G2/G3/B3, X-PN G3, X-S B3** These collated fastener lines for Hilti's gas-actuated and battery actuated tools are designed for applications in interior finishing, mechanical and electrical trades. These fasteners are used for fastenings in concrete and masonry (X-C G2/G3/B3 standard, X-P G2/G3/B3 premium), and steel (X-S B3 and X-P G2/G3). For more details refer to Section 3.2.9.

**DS/EDS Fastener Series** The DS series fastener is a high performance fastener of 0.177" shank diameter suitable for both concrete and steel applications. It is offered in a single fastener version only with a 10 mm dome head design and a 10 mm guidance washer. Available lengths are 3/4" through 2-1/2". Knurling is offered on 3/4" and 7/8" lengths; designated as EDS and ideally suited for steel applications.

**X-U 15 Steel Fastener** The X-U 15 is a premium, high performance fastener designed specifically for attachments to steel (e.g. drywall track, tagging, etc.). It is offered in a 0.145" shank diameter and 5/8" length with a unique step shank design as either single fasteners with metal tophat or collated in strips of 10.

#### Listings/Approvals

**ICC-ES (International Code Council)**  
 ESR-2269 with LABC/LARC Supplement (X-P, X-U and X-U 15)  
 ESR-1663 with LABC/LARC Supplement (DS, EDS, X-R and X-CR)  
 ESR-1752 with LABC/LARC Supplement (X-C, X-P G2/G3/B3, X-S)



### 3.2.5.2 MATERIAL SPECIFICATIONS

Fastener designation	Fastener material	Fastener plating <sup>1</sup>	Steel washer or clip material <sup>1,2</sup>	Washer or clip plating <sup>1,2</sup>
X-P	Carbon Steel	5 µm Zinc	N/A	N/A
X-U	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc
DS/EDS	Carbon Steel	5 µm Zinc	N/A	N/A
X-C	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc
X-R, X-CR <sup>3</sup>	SAE 316	N/A	SAE 316	N/A
X-C/ X-P/ X-PN/ X-S: G2/G3/B3	Carbon Steel	2-10 µm Zinc	N/A	N/A
X-CT Forming Nail	Carbon Steel	5 µm Zinc	N/A	N/A
BC X-C	Carbon Steel	5 µm Zinc	Carbon Steel	5 µm Zinc

- The 5 µm zinc coating is in accordance with ASTM B 633, SC 1, Type III. Refer to Section 2.3.3.1 for more information.
- Most fasteners have a plastic washer for guidance when installing. Not all fastener lengths have a pre-mounted steel washer. Refer to Section 3.2.2.4 for more information on available fasteners.
- The X-CR and X-R fastener material is a proprietary material, which provides a corrosion resistance equivalent to SAE 316 stainless steel. The steel washer material is SAE 316 stainless steel.

\* More details about the innovative X-P and X-U fasteners can be found in Section 3.2.6.

### 3.2.5.3 TECHNICAL DATA

#### Allowable loads in normal weight concrete <sup>1,2</sup>

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Concrete compressive strength							
				2000 psi		4000 psi		6000 psi		8000 psi	
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
Premium Concrete Fastener	X-P	0.157 (4.0)	3/4 (19)	100 (0.44)	155 (0.69)	100 (0.44)	175 (0.78)	105 (0.47)	205 (0.91)	135 (0.60)	205 (0.91)
			1 (25)	165 (0.73)	220 (0.98)	180 (0.80)	225 (1.00)	150 (0.67)	300 (1.33)	150 (0.67)	215 (0.96)
			1-1/4 (32)	240 (1.07)	310 (1.38)	280 (1.25)	310 (1.38)	180 (0.80)	425 (1.89)	-	-
			1-1/2 (38)	310 (1.38)	420 (1.87)	-	-	-	-	-	-
Universal Knurled Shank Fasteners	X-U	0.157 (4.0)	3/4 (19)	100 (0.44)	125 (0.57)	100 (0.44)	125 (0.57)	105 (0.47)	205 (0.91)	-	-
			1 (25)	165 (0.73)	190 (0.85)	170 (0.76)	225 (1.00)	110 (0.49)	280 (1.25)	-	-
			1-1/4 (32)	240 (1.07)	310 (1.38)	280 (1.25)	310 (1.38)	180 (0.80)	425 (1.89)	-	-
			1-1/2 (38)	275 (1.22)	420 (1.87)	325 (1.45)	420 (1.87)	-	-	-	-
Standard Fastener	X-C (Black collated strip or guidance washer)	0.138 (3.5)	3/4 (19)	45 (0.20)	75 (0.33)	65 (0.29)	105 (0.47)	95 (0.42)	195 (0.87)	-	-
			1 (25)	85 (0.38)	150 (0.67)	160 (0.71)	200 (0.89)	105 (0.47)	270 (1.20)	-	-
			1-1/4 (32)	130 (0.58)	210 (0.93)	270 (1.20)	290 (1.29)	165 (0.73)	325 (1.45)	-	-
			1-1/2 (38)	175 (0.78)	260 (1.16)	270 (1.20)	360 (1.60)	-	-	-	-
Heavy Duty Fastener	DS	0.177 (4.5)	3/4 (19)	50 (0.22)	120 (0.53)	125 (0.56)	135 (0.60)	-	-	-	-
			1 (25)	130 (0.58)	195 (0.87)	155 (0.69)	240 (1.07)	-	-	-	-
			1-1/4 (32)	220 (0.98)	385 (1.71)	270 (1.20)	425 (1.89)	-	-	-	-
			1-1/2 (38)	300 (1.33)	405 (1.80)	355 (1.58)	450 (2.00)	-	-	-	-
Stainless Steel Fastener	X-CR	0.145 (3.7)	3/4 (19)	30 (0.13)	40 (0.18)	65 (0.29)	40 (0.18)	-	-	-	-
			1 (25)	55 (0.24)	185 (0.82)	120 (0.53)	190 (0.85)	100 (0.44)	170 (0.76)	-	-
			1-1/4 (32)	110 (0.49)	290 (1.29)	125 (0.56)	300 (1.33)	120 (0.53)	440 (1.96)	-	-
			1-1/2 (38)	265 (1.18)	405 (1.80)	350 (1.56)	450 (2.00)	-	-	-	-
		0.157 (4.0)	-	-	-	-	-	-	-	-	
Gas Fastener	X-C B3, X-C G3	0.118 (3.0)	3/4 (19)	110 (0.5)	190 (0.9)	110 (0.5)	190 (0.9)	110 (0.5)	190 (0.9)	-	-
Premium Gas Fastener	X-P 17 G2, X-P 20 G2, X-P G3, X-P B3	0.118 (3.0)	5/8 (16)	-	-	50 (0.2)	120 (0.5)	50 (0.2)	90 (0.4)	-	-
			3/4 (19)	80 (0.4)	120 (0.5)	50 (0.2)	120 (0.5)	50 (0.2)	90 (0.4)	-	-
Forming Fastener	X-CT 47 <sup>3</sup>	0.145 (3.7)	1 (25)	60 (0.27)	65 (0.29)	-	-	-	-	-	-
	X-CT 62 <sup>3</sup>	0.145 (3.7)	1 (25)	75 (0.33)	75 (0.33)	-	-	-	-	-	-

- The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
- Multiple fasteners are recommended for any attachment.
- For temporary fastening of formwork only.

Allowable loads in minimum  $f'_c = 3000$  psi structural lightweight concrete<sup>1,5</sup>

Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Fastener location					
				Installed into concrete		Installed through 3" deep metal deck into concrete <sup>2,3</sup>			
				Tension lb (kN)	Shear lb (kN)	Tension lb (kN)		Shear lb (kN)	
						Upper flute	Lower flute	Upper flute	Lower flute
Premium Concrete Fastener	X-P*	0.157 (4.0)	3/4 (19)	155 (0.7)	165 (0.7)	130 (0.6)	105 (0.5)	285 (1.3)	285 (1.3)
			1 (25)	225 (1.0)	300 (1.3)	215 (1.0)	165 (0.7)	340 (1.5)	340 (1.5)
			1-1/4 (32)	325 (1.4)	445 (2.0)	295 (1.3)	230 (1.0)	375 (1.7)	375 (1.7)
			1-1/2 (38)	425 (1.9)	480 (2.1)	400 (1.8)	330 (1.5)	365 (1.6)	365 (1.6)
Universal Knurled Shank Fasteners	X-U*	0.157 (4.0)	3/4 (19)	125 (0.56)	115 (0.51)	130 (0.58)	95 (0.42)	245 (1.1)	245 (1.1)
			1 (25)	205 (0.91)	260 (1.16)	215 (0.96)	155 (0.69)	330 (1.5)	330 (1.5)
			1-1/4 (32)	315 (1.40)	435 (1.93)	295 (1.31)	200 (0.89)	375 (1.7)	375 (1.7)
			1-1/2 (38)	425 (1.89)	475 (2.11)	400 (1.78)	260 (1.16)	430 (1.9)	430 (1.9)
Standard Fastener	X-C (Black collated strip or guidance washer)	0.138 (3.5)	3/4 (19)	120 (0.53)	175 (0.78)	120 (0.53)	95 (0.42)	265 (1.2)	265 (1.2)
			1 (25)	180 (0.80)	260 (1.16)	215 (0.96)	155 (0.69)	485 (2.2)	485 (2.2)
			1-1/4 (32)	225 (1.00)	400 (1.78)	250 (1.11)	200 (0.89)	500 (2.2)	500 (2.2)
			1-1/2 (38)	285 (1.27)	400 (1.78)	285 (1.27)	210 (0.93)	555 (2.5)	555 (2.5)
Heavy Duty Fastener	DS <sup>4</sup>	0.177 (4.5)	3/4 (19)	100 (0.44)	200 (0.89)	100 (0.44)	-	200 (0.9)	200 (0.9)
			1 (25)	180 (0.80)	360 (1.60)	180 (0.80)	180 (0.80)	405 (1.8)	405 (1.8)
			1-1/4 (32)	300 (1.33)	520 (2.31)	300 (1.33)	250 (1.11)	515 (2.3)	515 (2.3)
			1-1/2 (38)	450 (2.00)	680 (3.02)	450 (2.00)	325 (1.45)	625 (2.8)	625 (2.8)
Stainless Steel Fastener	X-CR	0.145 (3.7)	1 (25)	230 (1.02)	240 (1.07)	230 (1.02)	-	240 (1.1)	240 (1.1)
		0.157 (4.0)	1-1/4 (32)	320 (1.42)	400 (1.78)	320 (1.42)	-	400 (1.8)	400 (1.8)
			1-1/2 (38)	405 (1.80)	500 (2.22)	405 (1.80)	-	500 (2.2)	500 (2.2)
Gas Fastener	X-C B3, X-C G3	0.118 (3.0)	3/4 (19)	115 (0.5)	140 (0.6)	75 (0.3)	85 (0.4)	175 (0.8)	215 (1.0)
			1 (25)	170 (0.8)	220 (1.0)	155 (0.7)	160 (0.7)	255 (1.1)	315 (1.4)
Premium Gas Fastener	X-P 17 G2, X-P 20 G2, X-P G3, X-P B3	0.118 (3.0)	5/8 (16)	60 (0.3)	140 (0.6)	60 (0.3)	60 (0.3)	175 (0.8)	215 (1.0)

1 The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC708. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.

2 The steel deck profile is 3" deep composite floor deck with a minimum thickness of 20 gauge (0.0358"). Figure 1 (Section 3.2.1.6) shows the nominal flute dimensions, fastener locations, and load orientations for the deck profile.

3 Structural lightweight concrete fill above top of metal deck shall be a minimum of 3-1/4" deep.

4 DS fasteners installed at 1-1/2" embedment through steel deck into the lower flute must be installed at a minimum distance of 6" from the edge of the floor deck.

5 Multiple fasteners are recommended for any attachment.

\* More details about the innovative X-P and X-U fasteners can be found in Section 3.2.6.

Allowable Loads Into Minimum  $f'_c = 3000$  psi Structural Lightweight Concrete Over 1-1/2" Deep, B-Type Steel Deck<sup>1,4</sup>

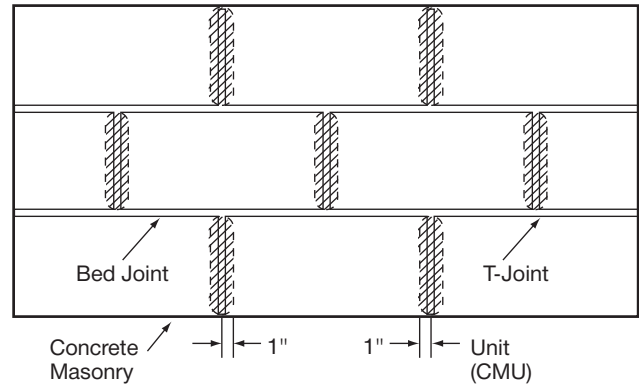
Fastener description	Fastener	Shank diameter in. (mm)	Minimum embedment in. (mm)	Fastener location installed through metal deck into concrete <sup>2,3</sup>				
				Tension lb (kN)				Shear
				Upper flute		Lower flute		lb (kN)
Premium concrete fastener	X-P	0.157 (4.0)	3/4 (19)	140 (0.6)	130 (0.6)	335 (1.5)		
			1 (25)	215 (1.0)	215 (1.0)	385 (1.7)		
			1-1/4 (32)	-	270 (1.2)	465 (2.1)		
Universal knurled shank fastener	X-U	0.157 (4.0)	3/4 (19)	95 (0.42)	95 (0.42)	370 (1.65)		
			1 (25)	125 (0.56)	125 (0.56)	415 (1.85)		
Standard fastener	X-C	0.138 (3.5)	3/4 (19)	80 (0.36)	80 (0.36)	315 (1.40)		
			1 (25)	205 (0.91)	205 (0.91)	445 (1.98)		
Gas fastener	X-C B3, X-C G3	0.118 (3.0)	3/4 (19)	75 (0.3)	85 (0.38)	175 (0.8)		
			1 (25)	155 (0.7)	160 (0.71)	255 (1.1)		
Premium gas fastener	X-P 17 G2, X-P 20 G2, X-P G3, X-P B3	0.118 (3.0)	5/8 (16)	60 (0.27)	60 (0.3)	175 (0.8)		

- 1 The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
- 2 Steel deck profiles are 1-1/2" deep, B-type deck with a minimum thickness of 20 gauge (0.0358" thick steel). Fasteners may be installed through the metal deck into lightweight concrete having both nominal and inverted deck profile orientations with a minimum lower flute width of 1-3/4" or 3-1/2", respectively. Fasteners shall be placed at centerline of deck flutes. Refer to Figures 2 and 3 (Section 3.2.1.6) for additional flute dimensions, fastener locations, and load orientations for both deck profiles.
- 3 Structural lightweight concrete fill above top of metal deck shall be a minimum 2-1/2" deep.
- 4 Multiple fasteners are recommended for any attachment.

### Allowable Loads in Concrete Masonry Units<sup>1,2,3,4,5,10</sup>

Fastener Description	Fastener	Shank diameter in. (mm)	Min. embed. in. (mm)	Hollow CMU				Grout filled CMU					
				Face shell <sup>6</sup>		Mortar joint		Face shell <sup>6</sup>		Mortar joint		Top of grouted cell <sup>8</sup>	
				Tension lb (kN)	Shear <sup>9</sup> lb (kN)	Tension lb (kN)	Shear <sup>7</sup> lb (kN)	Tension lb (kN)	Shear <sup>9</sup> lb (kN)	Tension lb (kN)	Shear <sup>7</sup> lb (kN)	Tension lb (kN)	Shear <sup>9</sup> lb (kN)
Premium concrete fastener	X-P	0.157 (4.0)	1 (25)	70 (0.31)	105 (0.47)	85 (0.38)	70 (0.31)	150 (0.67)	145 (0.65)	150 (0.67)	155 (0.69)	165 (0.73)	240 (1.07)
Universal knurled shank fasteners	X-U	0.157 (4.0)	1 (25)	70 (0.31)	85 (0.38)	25 (0.11)	70 (0.31)	225 (1.00)	220 (0.98)	150 (0.67)	190 (0.85)	165 (0.73)	240 (1.07)
Standard fastener	X-C	0.138 (3.5)	3/4 (19)	40 (0.18)	85 (0.38)	25 (0.11)	50 (0.22)	100 (0.44)	105 (0.47)	45 (0.20)	80 (0.36)	115 (0.51)	175 (0.78)
Gas fastener	X-C B3, X-C G3	0.118 (3.0)	3/4 (19)	145 (0.65)	190 (0.85)	80 (0.36)	80 (0.36)	155 (0.69)	195 (0.87)	110 (0.49)	135 (0.60)	105 (0.47)	145 (0.65)
			1 (25)	185 (0.82)	205 (0.91)	105 (0.47)	105 (0.47)	205 (0.91)	215 (0.96)	135 (0.60)	190 (0.85)	120 (0.53)	150 (0.67)
Gas fastener	X-C G2	0.108 (2.7)	3/4 (19)	75 (0.33)	140 (0.62)	60 (0.27)	80 (0.36)	100 (0.44)	170 (0.76)	100 (0.44)	160 (0.71)	80 (0.36)	130 (0.58)
			1 (25)	110 (0.49)	190 (0.85)	70 (0.31)	145 (0.65)	135 (0.60)	195 (0.87)	125 (0.56)	165 (0.73)	110 (0.49)	145 (0.65)

- 1 The tabulated allowable load values are for the low-velocity fastener only, using a safety factor of 5.0 or higher calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
- 2 The tabulated allowable load values are for low-velocity fasteners installed in normal weight or lightweight concrete masonry units conforming to ASTM C90.
- 3 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with mortar conforming to ASTM C270, Type N or S.
- 4 The tabulated allowable load values are for low-velocity fasteners installed in concrete masonry units with grout conforming to ASTM C476, as coarse grout.
- 5 The tabulated allowable load values are for one low-velocity fastener installed in an individual masonry unit cell and at least 4" from the edge of the wall.
- 6 Fastener can be located anywhere on the face shell or mortar joint as shown in the figure to the right.
- 7 Shear direction can be horizontal or vertical (Bed Joint or T-Joint) along the CMU wall plane.
- 8 Fastener located in center of grouted cell installed vertically.
- 9 Shear can be in any direction.
- 10 Multiple fasteners are recommended for any attachment.



Acceptable locations (NON-SHADED AREAS) for power-actuated fasteners in CMU walls

\* More details about the innovative X-P and X-U fasteners can be found in Section 3.2.6.

Allowable loads in minimum ASTM A36 ( $F_y \geq 36$  ksi,  $F_u \geq 58$  ksi) steel<sup>1,2,4,5</sup>

Fastener description	Fastener	Shank diameter in. (mm)	Steel thickness (in.)											
			1/8		3/16		1/4		3/8		1/2		≥3/4	
			Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
Universal knurled shank*	X-U <sup>6</sup>	0.157 (4.0)	-	-	500 (2.22)	720 (3.20)	775 (3.45)	720 (3.20)	935 (4.16)	720 (3.20)	900 (4.00)	720 (3.20)	350 (1.56)	375 (1.67)
Stepped-shank knurling-lengthwise	X-U 15 <sup>7</sup>	0.145 (3.7)	-	-	155 (0.69)	395 (1.76)	230 (1.02)	395 (1.76)	420 (1.87)	450 (2.00)	365 (1.62)	500 (2.22)	365 (1.62)	400 (1.78)
Standard knurled shank	X-S13	0.145 (3.7)	140 (0.62)	300 (1.33)	300 (1.33)	450 (2.00)	300 (1.33)	450 (2.00)	300 (1.33)	450 (2.00)	-	-	-	-
Drywall smooth shank w/metal top hat washer	X-S16 <sup>10</sup>	0.145 (3.7)	-	-	315 (1.40)	480 (2.14)	315 (1.40)	480 (2.14)	315 (1.40)	530 (2.36)	315 (1.40)	480 (2.14)	-	-
Heavy duty knurled shank	EDS <sup>3</sup>	0.177 (4.5)	-	-	305 (1.36)	615 (2.74)	625 (2.78)	870 (3.87)	715 (3.18)	870 (3.87)	890 (3.96)	960 (4.27)	400 (1.78)	655 (2.91)
Heavy duty smooth shank	DS	0.177 (4.5)	-	-	365 (1.62)	725 (3.22)	580 (2.58)	725 (3.22)	695 (3.09)	725 (3.22)	735 (3.27)	860 (3.83)	-	-
Stainless steel smooth shank	X-R <sup>8</sup> , X-CR	0.145 (3.7) 0.157 (4.0)	-	-	460 (2.05)	460 (2.05)	615 (2.74)	500 (2.22)	-	-	-	-	-	-
	X-R <sup>8,9</sup>	0.145 (3.7)	300 (1.33)	190 (0.85)	615 (2.74)	495 (2.20)	760 (3.38)	500 (2.22)	220 (0.98)	325 (1.45)	225 (1.00)	335 (1.49)	-	-
Standard gas fastener for steel	X-S 14 B3	0.118 (3.0)	140 (0.62)	230 (1.02)	220 (0.98)	245 (1.09)	225 (1.00)	290 (1.29)	280 (1.25)	330 (1.47)	280 (1.25)	330 (1.47)	280 (1.25)	330 (1.47)
Standard gas fastener for steel	X-S 14 B3 <sup>8</sup>	0.118 (3.0)	-	-	220 (0.98)	295 (1.31)	260 (1.16)	355 (1.58)	280 (1.25)	385 (1.71)	280 (1.25)	385 (1.71)	280 (1.25)	385 (1.71)
Premium gas fastener	X-P G3, X-P B3	0.118 (3.0)	125 (0.56)	230 (1.02)	170 (0.76)	245 (1.09)	200 (0.89)	230 (1.02)	250 (1.11)	255 (1.13)	-	-	-	-

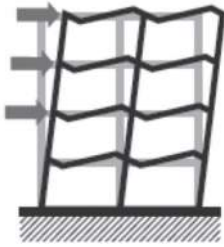
- The tabulated allowable load values are for the low-velocity fasteners only, using a safety factor that is greater than or equal to 5.0, calculated in accordance with ICC-ES AC70. Wood or steel members connected to the substrate must be investigated in accordance with accepted design criteria.
- Low-velocity fasteners shall be driven to where the point of the fastener penetrates through the steel base material in accordance with Section 3.2.2.3, except as noted in this table.
- EDS fasteners installed into greater than 1/2" thick steel require 1/2" minimum penetration.
- Multiple fasteners are recommended for any attachment.
- Refer to guidelines for fastening to steel, Section 3.2.2, for application limits.
- Tabulated allowable load values provided for 3/4" steel are based upon minimum point penetration of 1/2" into the steel. If 1/2" point penetration into the steel is not achieved, but a point penetration of at least 3/8" is obtained, the tabulated tension value should be reduced by 20 percent and the tabulated shear load should be reduced by 8 percent.
- X-U 15 fasteners installed into greater than 3/8" thick steel require 15/32" minimum penetration into the steel.
- Based on testing with  $F_y = 50$  ksi base material.
- Fasteners installed into 3/8" or thicker base require 0.38" minimum penetration depth into the steel.
- Published values may vary from values in ICC-ESR

Allowable tensile pullover and shear bearing load capacities for steel framing with power driven fasteners<sup>1,2,3,4</sup>

Fastener description	Fastener	Head dia. in. (mm)	Sheet steel thickness													
			14 ga.		16 ga.		18 ga.		20 ga.		22 ga.		24 ga.		25/26 ga.	
			Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
0.157" shank with or w/o plastic washers or MX collation	X-U, X-P	0.322 (8.2)	825 (3.67)	1,085 (4.83)	685 (3.05)	720 (3.20)	490 (2.18)	525 (2.34)	360 (1.60)	445 (1.98)	300 (1.33)	330 (1.47)	205 (0.91)	255 (1.13)	120 (0.53)	145 (0.64)
0.145" shank with or w/o plastic washers or MX collation	X-C, X-R	0.322 (8.2)	-	985 (4.38)	685 (3.05)	720 (3.20)	490 (2.18)	515 (2.29)	360 (1.60)	440 (1.96)	300 (1.33)	310 (1.38)	205 (0.91)	235 (1.05)	120 (0.53)	145 (0.64)
0.177" shank without washer	DS, EDS	0.322 (8.2)	965 (4.29)	1,085 (4.83)	810 (3.60)	815 (3.63)	625 (2.78)	535 (2.38)	460 (2.05)	465 (2.07)	360 (1.60)	350 (1.56)	300 (1.33)	260 (1.16)	240 (1.07)	180 (0.80)
0.145" shank with plastic top hat washers	X-S13 THP X-S16 TH	0.322 (8.2)	-	985 (4.38)	685 (3.05)	720 (3.20)	490 (2.18)	515 (2.29)	360 (1.60)	440 (1.96)	300 (1.33)	310 (1.38)	205 (0.91)	235 (1.05)	120 (0.53)	145 (0.64)

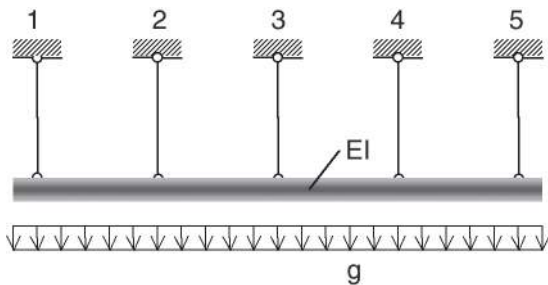
- Allowable load values are based on a safety factor of 3.0.
- Allowable pullover capacities of sheet steel should be compared to the allowable fastener tensile load capacities in concrete, steel, and masonry to determine controlling resistance load.
- Allowable shear bearing capacities of sheet steel should be compared to allowable fastener shear capacities in concrete, steel and masonry to determine controlling resistance load.
- Data is based on the following minimum sheet steel properties,  $F_y = 33$  ksi,  $F_u = 45$  ksi (ASTM A653 material).

\* More details about the innovative X-U fastener can be found in Section 3.2.6.



## 2.4.2 NONSTRUCTURAL SYSTEMS

Nonstructural systems are separate from structural systems and a clear distinction is made in the building codes and standards. These applications may involve suspended ceilings, conduit attachments, mechanical, plumbing, electrical and communications equipment, doors, windows, wood sill plates, cold-formed steel track attachments, architectural components and other applications that are not part of the structural systems.



ASCE 7-10 Minimum Design Loads for Building and Other Structures, which is referenced in the IBC 2015 and 2018, clarified language pertaining to the use of power-actuated fasteners for nonstructural component fastenings including suspended ceilings and distributed systems. A distributed system includes multiple fastening points for redundancy and load distribution across linear or grid like arrangements of fasteners. ASCE 7-10 Section 13.4.5 further establishes conservative baseline limiting load capacities for power-actuated fasteners at 90 lb (400 N) for concrete base materials and 250 lb (1,112 N) for steel base materials in typical applications, unless otherwise tested and approved for other load capacities. This clarified language pertaining to power-actuated fastening applications in all seismic design categories, including use as part of distributed systems in higher Seismic Design Categories D through F, is incorporated into the latest ICC-ES AC70 Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements. In addition, ICC-ES AC70 Annex A provides testing and acceptance criteria for power-driven fasteners in steel base materials to allow development of allowable load values greater than 250 lb (1,112 N). All Hilti power-driven fasteners intended for steel applications have been successfully tested per the ICC-ES AC70 Annex A seismic testing requirements. Reference Hilti power-actuated fastener evaluation reports ESR-2269, ESR-1663, ESR-1752, ESR-2347 and ESR-2795 for more detailed information.

Additional seismic research is being conducted to evaluate the performance of power-actuated fasteners in both structural and nonstructural applications. In 2012, the University of California San Diego (UCSD) Building Nonstructural Component and System (BNCS) seismic research project sponsored by the National Science Foundation (NSF) and Network for Earthquake Engineering Simulation (NEES) involved the use of power-actuated fasteners for many common nonstructural applications including lay-in acoustical ceilings, cold-formed steel interior partition walls, exterior balloon framing walls and electrical conduit attachments. The initial results are promising and provide additional confirmation that power-actuated fasteners are reliable attachment methods for these typical applications in seismic events. Further research is being conducted by Hilti to extend the load capacities and applications of power-actuated fastenings in steel base materials as part of diaphragms, shear walls and nonstructural component fastenings.



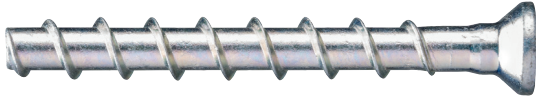
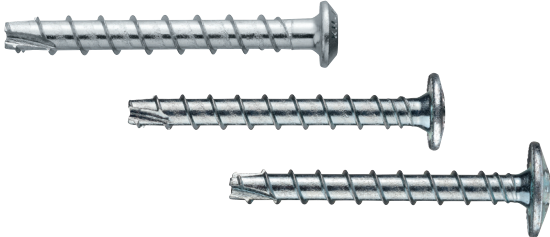
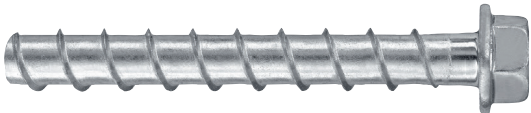
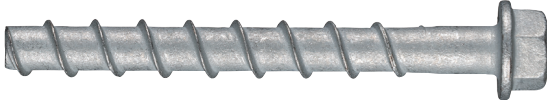
In 2012, AISI also established design provisions for power-actuated fastenings in steel base materials and these are now codified in Section J5 of AISI S100. These provisions formally recognize power-actuated fasteners consistent with an extensive historical use in cold-formed steel framing applications and provide a rational basis for the determination of safety and resistance factors consistent with LRFD and LSD design provisions with the corresponding safety and resistance factors for steel fastenings is a significant development for power-actuated fastening technology in North America, as previously, only ASD design was used based on a minimum safety factor of 5:1. The data contained herein this Product Technical Guide is still presented in the traditional ASD format for steel base materials, with the ICC-ES AC70 minimum safety factor of 5:1 applied, but alternative safety and resistance factors are provided in the AISI S100 specification for a more optimized and statistically justified design approach.



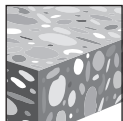
### 3.3.6 KWIK HUS-EZ SCREW ANCHOR

#### PRODUCT DESCRIPTION

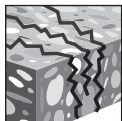
##### KWIK HUS EZ carbon steel anchors

Anchor System	Features and Benefits
 <p>Carbon Steel KH-EZ C 1/4" and 3/8"</p>	<ul style="list-style-type: none"> <li>• OSHA Table 1926.1153 Table 1 complaint installation when installed with Hilti vacuum and DRS system or Hilti SafeSet™ hollow drill bit technology</li> <li>• Easy installation using impact tool or torque wrench</li> </ul>
 <p>Carbon Steel 1/4" KH-EZ P, PM, PL</p>	<ul style="list-style-type: none"> <li>• Product and length identification marks helps facilitate quality control after installation</li> <li>• Through fixture installation improves productivity and more accurate installation.</li> <li>• Thread design helps enable quality setting and exceptional load values in wide variety of base material strengths.</li> </ul>
 <p>Carbon Steel KH EZ 1/4"-3/4"</p>	<ul style="list-style-type: none"> <li>• 1/4" diameter available in hex head countersunk head and pan head styles.</li> <li>• Anchor is fully removable.</li> <li>• Anchor diameter is same as drill bit diameter. No special diameter bit required.</li> <li>• Suitable for reduced edge distances and spacing.</li> </ul>
 <p>Carbon Steel KH-EZ CRC 3/8"-3/4"</p>	<ul style="list-style-type: none"> <li>• Corrosion resistant coating allows for use in outdoor moderate corrosive environments (KH-EZ CRC only).</li> <li>• Installation process allows for adjustability.</li> </ul>

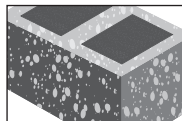
3.3.6



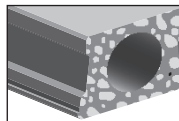
Uncracked concrete



Cracked concrete



Grout-filled concrete masonry



Hollowcore concrete



Seismic Design Categories A-F



SafeSet™ System with Hollow Drill Bit



Profis Anchor design software

Approvals/Listings	
<b>ICC-ES (International Code Council)</b>	ESR-3027 in concrete per ACI 318 Ch. 17 / ACI 355.2/ ICC-ES AC193 ESR-3056 in grout-filled CMU per ICC-ES AC106
<b>City of Los Angeles</b>	City of Los Angeles 2020 LABC Supplement (within ESR-3027 and ESR-3056)
<b>Florida Building Code</b>	2020 FBC w/ HVHZ (within ESR-3027 and ESR-3056)
<b>FM (Factory Mutual)</b>	Pipe hanger components for automatic sprinkler systems for KH-EZ I and KH-EZ E
<b>ANSI/MSS SP-58-2018</b>	Anchors conform to ANSI/MSSP-58-2018. Contact Hilti for more information.



## MATERIAL SPECIFICATIONS

Heat treated carbon steel with a minimum zinc coating of 0.0003 inch (8 µm) thick in accordance with DIN EN ISO 4042.

KH-EZ CRC has mechanically deposited zinc coating with a minimum thickness of 0.0021 inch (53 µm) in accordance with ASTM B695, Class 55.

## INSTALLATION PARAMETERS

**Table 1 — Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC specifications**

Setting information	Symbol	Units	Nominal anchor diameter													
			1/4		3/8			1/2			5/8			3/4		
Head style and coating			Hex, P, PM, PL, C head		Hex, C head			Hex, C head (Including CRC)			Hex head (Including CRC)			Hex head (Including CRC)		
Nominal bit diameter	$d_{bit}$	in.	1/4		3/8			1/2			5/8			3/4		
Minimum nominal embedment	$h_{nom}$	in.	1-5/8	2-1/2	1-5/8	2-1/8	2-1/2	3-1/4	2-1/4	3	4-1/4	3-1/4	4	5	4	6-1/4
Minimum effective embedment	$h_{ef}$	in.	1.18	1.92	1.11	1.54	1.86	2.50	1.50	2.16	3.22	2.39	3.03	3.88	2.92	4.84
Minimum hole depth	$h_o$	in.	2	2-7/8	1-7/8	2-3/8	2-3/4	3-1/2	2-5/8	3-3/8	4-5/8	3-5/8	4-3/8	5-3/8	4-3/8	6-5/8
Minimum fixture hole diameter	$d_h$	in.	3/8		1/2			5/8			3/4			7/8		
Anchor Length = $h_{nom} + t$	$\ell$		See ordering information													
Installation torque concrete <sup>1</sup>	$T_{inst}$	ft-lb (Nm)	18 (24)	19 (26)	40 (54)			45 (61)			85 (115)			95 <sup>4</sup> (129)		
Maximum impact wrench torque rating concrete <sup>2</sup>	$T_{impact,max}$	ft-lb (Nm)	157 (213)	157 (213)	450 (610)			137 (186)	450 (610)			590 (800)			590 (800)	
Installation torque masonry KH-EZ (P, PM, PL, C) <sup>1</sup>	$T_{inst}$	ft-lb (Nm)	21 (28)		22 (30)			34 (46)			38 (52)			70 (95)		
Installation torque masonry for KH-EZ CRC <sup>1</sup>	$T_{inst}$	ft-lb (Nm)			20 (27)			25 (34)			35 (48)			45 (61)		
Maximum impact wrench torque rating masonry for KH-EZ (P, PM, PL, C) <sup>2,3</sup>	$T_{impact,max}$	ft-lb (Nm)	114 (155)		114 (155)			332 (450)			332 (450)			332 (450)		
Maximum impact wrench torque rating masonry for KH-EZ CRC <sup>2,3</sup>	$T_{impact,max}$	ft-lb (Nm)			100 (136)			100 (136)			332 (450)			332 (450)		
Wrench size		in.	7/16		9/16			3/4			15/16			1-1/8		

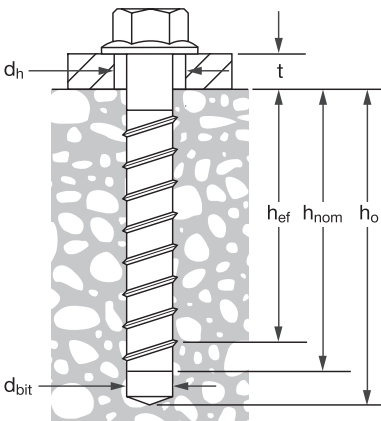
<sup>1</sup>  $T_{inst}$  is the maximum installation torque that may be applied with a torque wrench.

<sup>2</sup> Because of variability in measurement procedures, the published torque of an impact tool may not correlate properly with the above setting torques. Over torquing can damage the base material, anchor and/or reduce its holding capacity.

<sup>3</sup> For more information on KH-EZ installed in masonry, see ESR-3056 and Design Information for Masonry in this section.

<sup>4</sup> Maximum installation torque in concrete for 3/4-in diameter KH-EZ CRC is 95 ft-lbs. (115 Nm).

**Figure 1 — Hilti KH-EZ specifications**



## DESIGN INFORMATION IN CONCRETE PER ACI 318

### ACI 318 Chapter 17 design

The load values contained in this section are Hilti Simplified Design Tables. The load tables in this section were developed using the Strength Design parameters and variables of ESR-3027 and the equations within ACI 318 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8 of the North American Product Technical Guide, Volume 2: Anchor Fastening Technical Guide, Edition 22 (PTG Ed. 21). Data tables from ESR-3027 are not contained in this section, but can be found at [www.icc-es.org](http://www.icc-es.org) or at [www.hilti.com](http://www.hilti.com).

**Table 16 — Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC in the soffit of uncracked lightweight concrete over metal deck<sup>1,2,3,4,5,6</sup>**

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - $\phi N_n$		Shear - $\phi V_n$		Tension - $\phi N_n$		Shear - $\phi V_n$	
		$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)
1/4	1-5/8 (41)	545 (2.4)	595 (2.6)	725 (3.2)	725 (3.2)	670 (3.0)	730 (3.2)	725 (3.2)	725 (3.2)
	2-1/2 (64)	1,220 (5.4)	1,410 (6.3)	1,325 (5.9)	1,325 (5.9)	1,275 (5.7)	1,470 (6.5)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	845 (3.8)	975 (4.3)	905 (4.0)	905 (4.0)	970 (4.3)	1,120 (5.0)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,455 (6.5)	1,680 (7.5)	905 (4.0)	905 (4.0)	1,900 (8.5)	2,195 (9.8)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	2,550 (11.3)	2,945 (13.1)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
1/2	2-1/4 (57)	850 (3.8)	980 (4.4)	965 (4.3)	965 (4.3)	905 (4.0)	1,045 (4.6)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,990 (8.9)	2,300 (10.2)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	3,485 (15.5)	4,025 (17.9)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
5/8	3-1/4 (83)	2,715 (12.1)	3,135 (13.9)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	6,170 (27.4)	7,125 (31.7)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	2,715 (12.1)	3,135 (13.9)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

**Table 17 — Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC in the soffit of cracked lightweight concrete over metal deck<sup>1,2,3,4,5,6</sup>**

Nominal anchor diameter in.	Nominal embedment in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - $\phi N_n^7$		Shear - $\phi V_n^8$		Tension - $\phi N_n^7$		Shear - $\phi V_n^8$	
		$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 3,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)
1/4	1-5/8 (41)	280 (1.2)	305 (1.4)	725 (3.2)	725 (3.2)	340 (1.5)	370 (1.6)	725 (3.2)	725 (3.2)
	2-1/2 (64)	605 (2.7)	700 (3.1)	1,325 (5.9)	1,325 (5.9)	635 (2.8)	735 (3.3)	1,960 (8.7)	1,960 (8.7)
3/8	1-5/8 (41)	525 (2.3)	605 (2.7)	905 (4.0)	905 (4.0)	770 (3.4)	770 (3.4)	2,200 (9.8)	2,200 (9.8)
	2-1/2 (64)	1,035 (4.6)	1,195 (5.3)	905 (4.0)	905 (4.0)	1,340 (6.0)	1,340 (6.0)	3,655 (16.3)	3,655 (16.3)
	3-1/4 (83)	1,805 (8.0)	2,085 (9.3)	2,165 (9.6)	2,165 (9.6)	n/a	n/a	n/a	n/a
5/8	2-1/4 (57)	535 (2.4)	620 (2.8)	965 (4.3)	965 (4.3)	640 (2.8)	740 (3.3)	4,710 (21.0)	4,710 (21.0)
	3 (76)	1,255 (5.6)	1,450 (6.4)	1,750 (7.8)	1,750 (7.8)	n/a	n/a	n/a	n/a
	4-1/4 (108)	1,195 (5.3)	2,535 (11.3)	2,155 (9.6)	2,155 (9.6)	n/a	n/a	n/a	n/a
3/4	3-1/4 (83)	1,710 (7.6)	1,975 (8.8)	2,080 (9.3)	2,080 (9.3)	n/a	n/a	n/a	n/a
	5 (127)	3,885 (17.3)	4,485 (20.0)	2,515 (11.2)	2,515 (11.2)	n/a	n/a	n/a	n/a
3/4	4 (102)	1,710 (7.6)	1,975 (8.8)	2,255 (10.0)	2,255 (10.0)	n/a	n/a	n/a	n/a

1 See PTG Ed. 21 Section 3.1.8 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is  $3 \times h_{nom}$  (nominal embedment).

4 Tabular values are lightweight concrete and no additional reduction factor is needed.

5 No additional reduction factors for spacing or edge distance need to be applied.

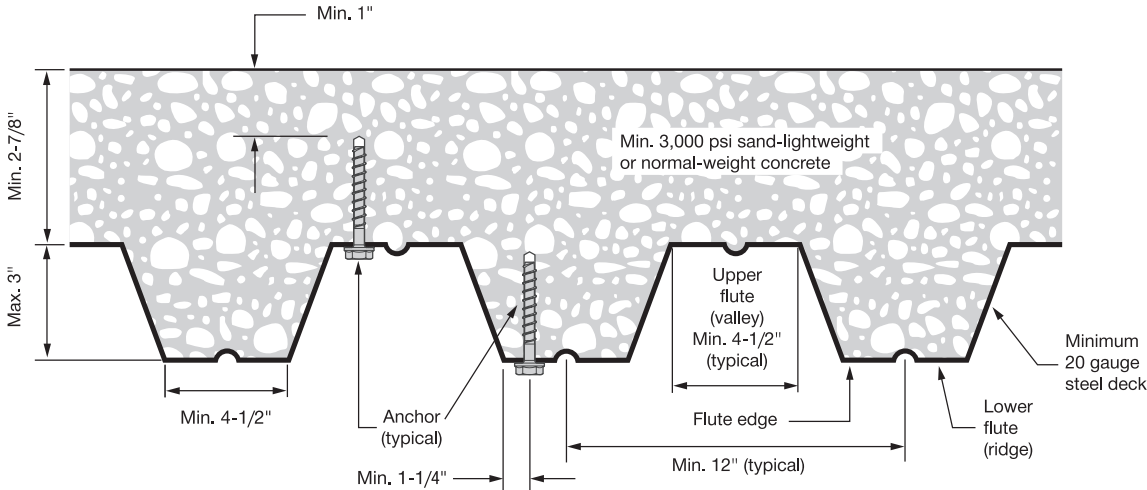
6 Comparison to steel values in table 4 is not required. Values in tables 16 and 17 control.

7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension only by  $\alpha_{N,seis} = 0.75$ . See PTG Ed. 21 Section 3.1.8 for additional information on seismic applications.

8 From the following anchor sizes, an additional factor for seismic shear must be applied to the cracked concrete tabular values for seismic conditions:

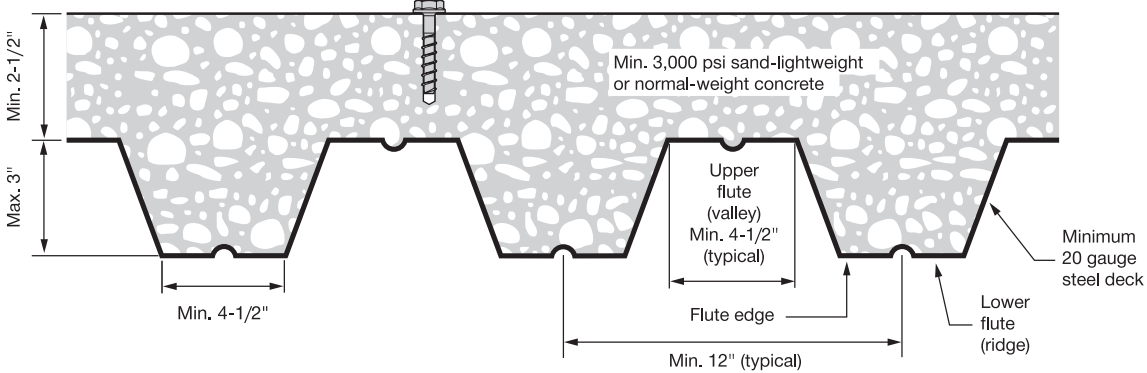
- 1/4-inch diameter -  $\alpha_{V,seis} = 0.75$
- 3/8-inch diameter -  $\alpha_{V,seis} = 0.60$
- 1/2-inch diameter -  $\alpha_{V,seis} = 0.60$
- 5/8-inch diameter -  $\alpha_{V,seis} = 0.60$
- 3/4-inch diameter -  $\alpha_{V,seis} = 0.70$

**Figure 3 — Installation of Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC in soffit of concrete over steel deck floor and roof assemblies<sup>1</sup>**



1 Anchors may be placed in the upper or lower flute of the steel deck profile provided the minimum concrete cover above the drilled hole is satisfied. Anchors in the lower flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. The offset distance may be increased proportionally for profiles with lower flute widths greater than those shown provided the minimum lower flute edge distance is also satisfied.

**Figure 4 — Installation of Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC on the top of sand-lightweight concrete over metal floor and roof assemblies**



3.3.6

**Table 18 — Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC in the top of uncracked concrete over metal deck<sup>1,2,3,4,5</sup>**

Nominal anchor diameter in.	Nominal embedment depth in. (mm)	Tension - $\phi N_n$		Shear - $\phi V_n$	
		$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	620 (2.8)	675 (3.0)	1,180 (5.2)	1,360 (6.0)
3/8	1-5/8 (41)	1,000 (4.4)	1,155 (5.1)	1,075 (4.8)	1,245 (5.5)

**Table 19 — Hilti KH-EZ, KH-EZ P, KH-EZ PM, KH-EZ PL, KH-EZ C and KH-EZ CRC in the top of cracked concrete over metal deck<sup>1,2,3,4,5</sup>**

Nominal anchor diameter in.	Nominal embedment depth in. (mm)	Tension - $\phi N_n$		Shear - $\phi V_n$	
		$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)
1/4	1-5/8 (41)	315 (1.4)	345 (1.5)	835 (3.7)	965 (4.3)
3/8	1-5/8 (41)	520 (2.3)	600 (2.7)	760 (3.4)	880 (3.9)

- See PTG Ed. 21 Section 3.1.8 to convert design strength value to ASD value.
- Linear interpolation between embedment depths and concrete compressive strengths is not permitted.
- Apply spacing, edge distance, and concrete thickness factors in tables 20 and 21 as necessary. Compare to the steel values in table 4. The lesser of the values is to be used for the design.
- Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by  $\lambda_s$  as follows:  
for sand-lightweight,  $\lambda_s = 0.68$ ; for all-lightweight,  $\lambda_s = 0.60$
- Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by the following reduction factors:  
1/4-inch diameter -  $\alpha_{N,seis} = 0.60$   
3/8-inch diameter -  $\alpha_{N,seis} = 0.75$ .  
No reduction needed for seismic shear. See PTG Ed. 21 Section 3.1.8 for additional information on seismic applications.

# SCW Head-of-Wall Slide-Clip Connector

The SCW connectors offer 1" of upward and 1" of downward movement. They are primarily used in head-of-wall applications that require vertical movement relative to the structure. SCW connectors are often used to strengthen window and door jambs for projects that utilize slip or slotted track.

**Material:** 54 mil (16 ga.)

**Finish:** Galvanized (G90)

**Installation:**

- Use the specified type and number of anchors.
- Use the specified number of #14 shouldered screws (included). Install shouldered screws in the slots adjacent to the No-Equal® stamp.
- Use a maximum of one screw per slot.
- For installations to wood framing, see Simpson Strong-Tie® engineering letter L-CF-DEFCLIPW at [strongtie.com](http://strongtie.com).

**Codes:** See p. 13 for Code Reference Key Chart

**Ordering Information:**

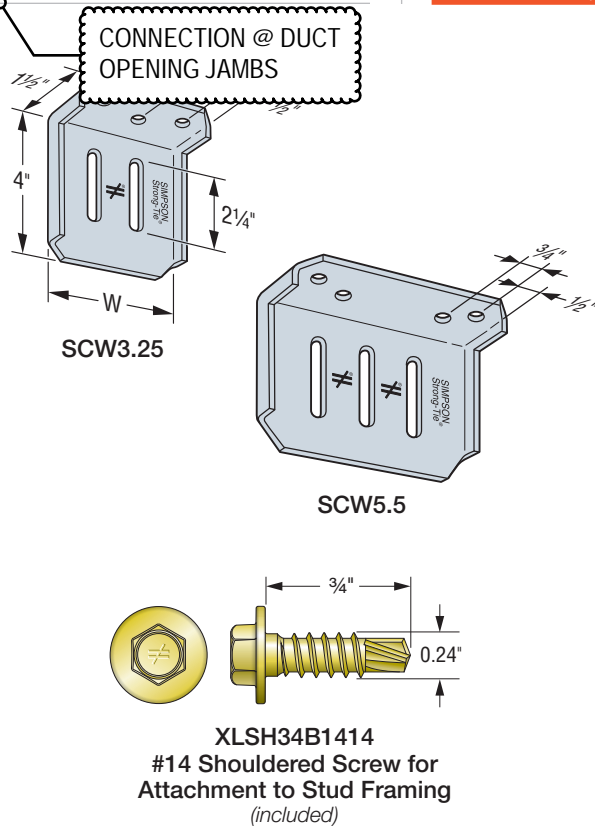
SCW3.25-KT contains:

- Box of 25 connectors
- 55 XLSH34B1414 #14 shouldered screws

SCW5.5-KT contains:

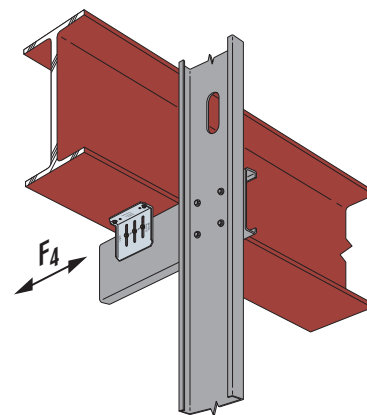
- Box of 25 connectors
- 83 XLSH34B1414 #14 shouldered screws

**Note:** Replacement #14 shouldered screws for SCW connectors are XLSH34B1414-RP83.



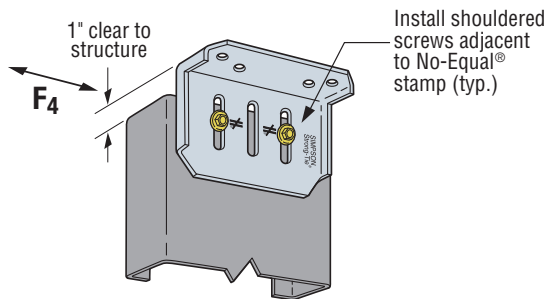
## SCW Allowable Connector Loads (lb.)

Model No.	Connector Material Thickness mil (ga.)	W (in.)	No. of #14 Shouldered Screws	Stud Thickness			Code Ref.
				33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)	
				F <sub>4</sub>	F <sub>4</sub>	F <sub>4</sub>	
SCW3.25	54 (16)	3 1/4	2	455	630	755	IBC, FL, LA
SCW5.5	54 (16)	5 1/2	2 <sup>1</sup>	455	630	995	
			3	455	630	1,220 <sup>2</sup>	

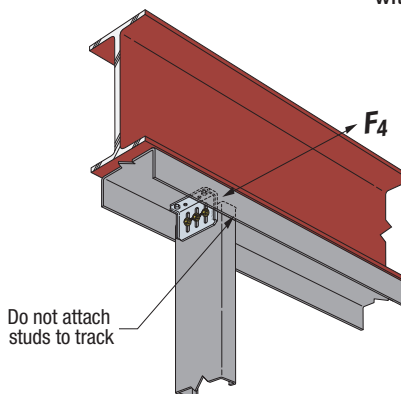


Typical SCW Installation with Stud Strut

1. When the SCW5.5 connector is used with two shouldered screws, install screws in the outermost slots.
2. Allowable loads are based on clips installed with all holes in the anchor leg filled with #12-14 screws. For other anchorage installations, the capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCW Allowable Anchorage Loads table on p. 49.
3. Tabulated loads are applicable for the following framing widths:  
 SCW3.25 — 3 1/2", 3 3/8", 4" and 5 1/2"  
 SCW5.5 — 6", 8" (18 ga. min.), 10" and 12" (16 ga. min.)



SCW5.5 Installation with Two Shouldered Screws (three shouldered screws and SCW3.25 similar)



Typical SCW Installation at Stud

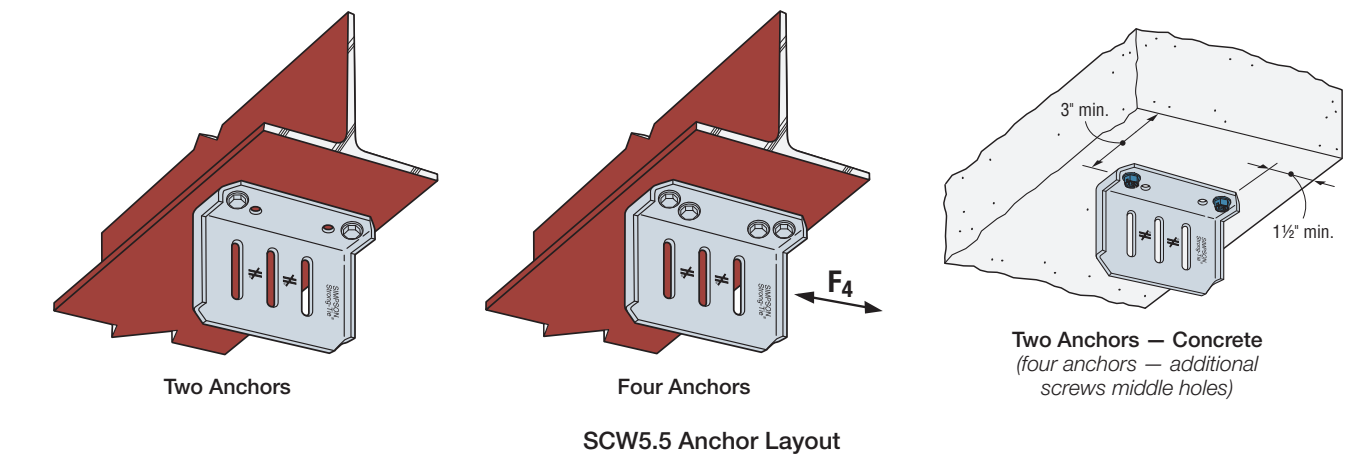
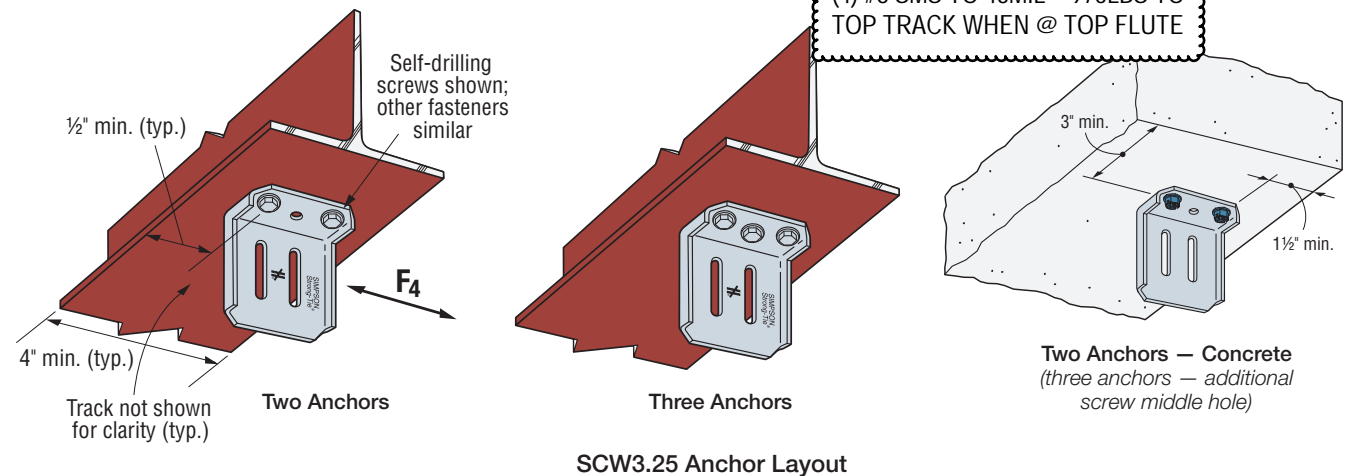
# SCW Head-of-Wall Slide-Clip Connector

## SCW Allowable Anchorage Loads (lb.)

Model No.	Anchorage Type	Minimum Base Material	No. of Anchors	Allowable Load F <sub>4</sub>
SCW3.25	#12-24 self-drilling screws	A36 steel 3/16" thick	2	715
			3	1,075
	Simpson Strong-Tie® 0.157" x 3/16" powder-actuated fasteners PDPAT-62KP	A36 steel 3/16" thick	2	715
			3	1,075
	Simpson Strong-Tie 1/4" x 1 3/4" Titen Turbo™ <sup>3</sup>	Concrete f' <sub>c</sub> = 2,500 psi	2	285
			3	350
SCW5.5	#12-24 self-drilling screws	A36 steel 3/16" thick	2	775
			4	1,550
	Simpson Strong-Tie 0.157" x 3/16" powder-actuated fasteners PDPAT-62KP	A36 steel 3/16" thick	2	745
			4	1,490
	Simpson Strong-Tie 1/4" x 1 3/4" Titen Turbo <sup>3</sup>	Concrete f' <sub>c</sub> = 2,500 psi	2	285
			4	775

- For additional important information, see General Information and Notes on p. 26.
- Allowable loads are for clip anchorage only. The capacity of the connection system will be the minimum of the tabulated value and the allowable load from the SCW Allowable Connector Loads table on p. 48.
- Tabulated values require a minimum 1 1/2" edge distance for masonry screws in concrete.
- See the current *Fastening Systems* catalog at [strongtie.com](http://strongtie.com) for more information on Simpson Strong-Tie products.

(2) Ø1/4"x1-7/8" HILTI KH-EZ = 762LBS TO BOTTOM FLUTE  
(4) #8 SMS TO 43MIL = 976LBS TO TOP TRACK WHEN @ TOP FLUTE



# RCA Rigid Connector Angles

The Simpson Strong-Tie® rigid connector angle is a general purpose clip angle designed for a wide range of cold-formed steel construction applications. With prepunched holes for fastener attachment, these L-shaped clips save time and labor on the job.

**Features:**

- Use with miscellaneous header/sill connections to jamb studs, jamb stud reinforcement at track, u-channel bridging, stud-blocking, bypass curtain-wall framing, joist connections and other versatile options
- Easy to install, with prepunched holes for quick and accurate fastener attachment

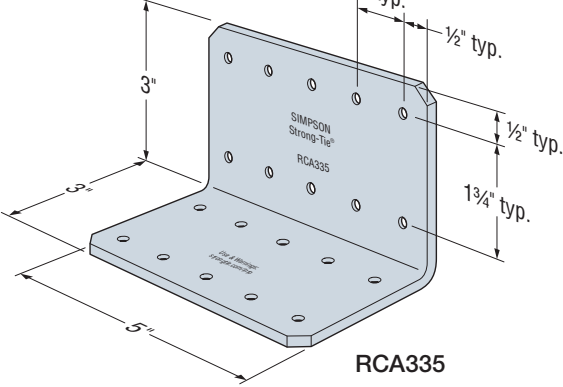
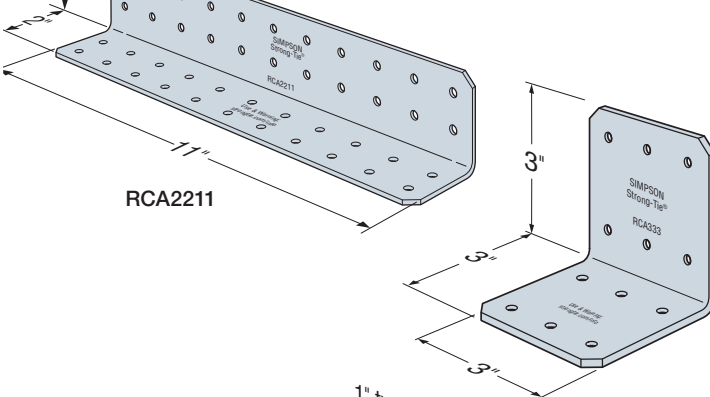
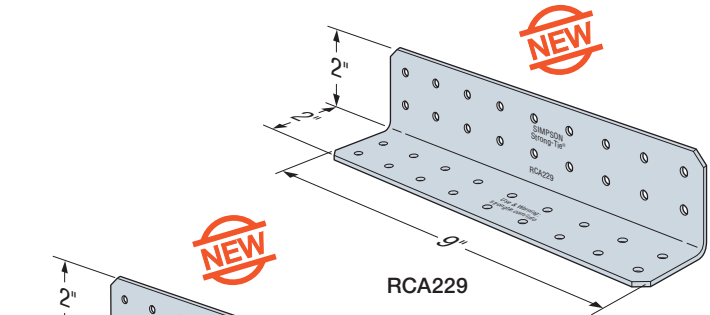
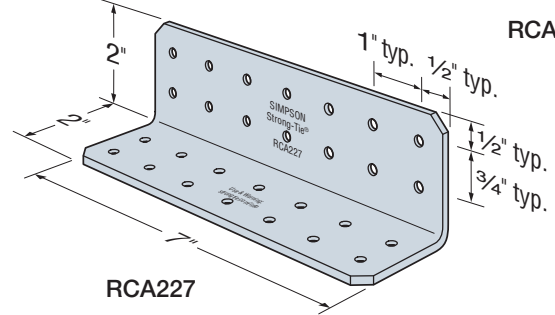
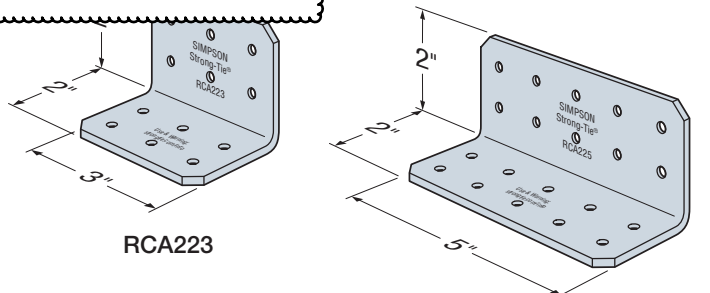
**Material:** RCAXXX/54 — 54 mil (16 ga.), 50 ksi  
 RCAXXX/68 — 68 mil (14 ga.), 50 ksi  
 RCAXXX/97 — 97 mil (12 ga.), 50 ksi  
 (Note: “XXX” is model number shown below.)

**Finish:** Galvanized (G90)

**Installation:**

- Use all specified anchors/fasteners

**HEADER & SOFFIT ATTACHMENT TO JAMB**



## Ordering Information

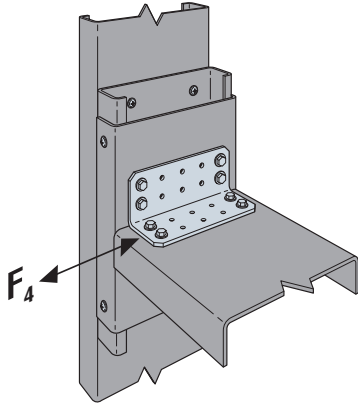
Model No.	Ordering SKU	Bucket Quantity
RCA223/54	RCA223/54-R150	150
RCA223/68	RCA223/68-R125	125
RCA223/97	RCA223/97-R90	90
RCA225/54	RCA225/54-R90	90
RCA225/68	RCA225/68-R75	75
RCA225/97	RCA225/97-R55	55
RCA227/54	RCA227/54-R65	65
RCA227/68	RCA227/68-R55	55
RCA227/97	RCA227/97-R40	40
RCA229/54	RCA229/54-R50	50
RCA229/68	RCA229/68-R50	50
RCA229/97	RCA229/97-R35	35
RCA2211/54	RCA2211/54-R45	45
RCA2211/68	RCA2211/68-R40	40
RCA2211/97	RCA2211/97-R30	30
RCA333/54	RCA333/54-R100	100
RCA333/68	RCA333/68-R85	85
RCA333/97	RCA333/97-R60	60
RCA335/54	RCA335/54-R60	60
RCA335/68	RCA335/68-R50	50
RCA335/97	RCA335/97-R35	35

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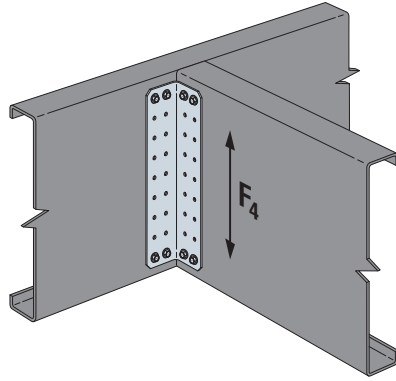
Rigid Connectors

# RCA Rigid Connector Angles

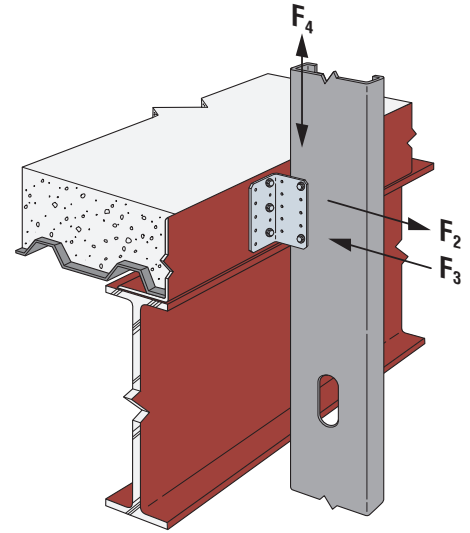
Rigid Connectors



Typical RCA225 Installation at Sill/Jamb



Typical RCA229 Installation at Joist Connection



Typical RCA335 Installation at Bypass Framing

## Screw Patterns for Rigid Connector Angles

Models	Pattern 3A	Pattern 3B	Pattern 3C		
RCA223/54 RCA223/68 RCA223/97 RCA333/54 RCA333/68 RCA333/97					
Models	Pattern 5A	Pattern 5B	Pattern 5C	Pattern 5D	Pattern 5E
RCA225/54 RCA225/68 RCA225/97 RCA335/54 RCA335/68 RCA335/97					
Models	Pattern 7A	Pattern 7B	Pattern 7C	Pattern 7D	Pattern 7E
RCA227/54 RCA227/68 RCA227/97					
Models	Pattern 9A	Pattern 9B	Pattern 9C	Pattern 9D	Pattern 9E
RCA229/54 RCA229/68 RCA229/97					
Models	Pattern 11A	Pattern 11B	Pattern 11C	Pattern 11D	Pattern 11E
RCA2211/54 RCA2211/68 RCA2211/97					

## RCA Rigid Connector Angles

## RCA Rigid Connector Angles Allowable Loads (lb.)

Model	No. of #10 Screws <sup>5,6</sup>	Screw Pattern	Stud Framing Thickness <sup>1</sup>								
			33 mil (20 ga.)			43 mil (18 ga.)			54 mil (16 ga.)		
			F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
RCA223/54	3	3A	205	495	200	205	590	310	205	590	620
	4	3B	205	580	390	205	580	605	205	580	1,095
	6	3C	205	865	480	205	865	740	205	865	1,095
RCA223/68	3	3A	310	495	200	310	765	310	310	815	620
	4	3B	310	660	390	310	805	605	310	805	1,210
	6	3C	310	990	480	310	1,205	740	310	1,205	1,350
RCA223/97	3	3A	495	495	200	630	765	310	630	1,415	620
	4	3B	630	660	390	630	1,020	605	630	1,265	1,210
	6	3C	630	990	480	630	1,530	740	630	1,895	1,485
RCA225/54	2	5A	330	330	265	340	390	410	340	390	815
	4	5B	340	580	535	340	580	830	340	580	1,660
	5	5C	340	825	460	340	980	705	340	980	1,310
	8	5D	340	1,155	915	340	1,155	1,420	340	1,155	1,825
	10	5E	340	1,445	1,035	340	1,445	1,600	340	1,445	1,825
RCA225/68	2	5A	330	330	265	510	510	410	520	545	815
	4	5B	520	660	535	520	805	830	520	805	1,660
	5	5C	520	825	460	520	1,275	705	520	1,360	1,415
	8	5D	520	1,320	915	520	1,605	1,420	520	1,605	2,255
	10	5E	520	1,650	1,035	520	2,010	1,600	520	2,010	2,255
RCA225/97	2	5A	330	330	265	510	510	410	1,020	945	815
	4	5B	660	660	535	1,020	1,020	830	1,050	1,265	1,660
	5	5C	825	825	460	1,050	1,275	705	1,050	2,360	1,415
	8	5D	1,050	1,320	915	1,050	2,040	1,420	1,050	2,525	2,835
	10	5E	1,050	1,650	1,035	1,050	2,550	1,600	1,050	3,155	3,200
RCA227/54	4	7A	475	660	545	475	785	840	475	785	1,675
	4	7B	475	580	595	475	580	920	475	580	1,840
	7	7C	475	1,155	765	475	1,280	1,185	475	1,280	1,685
	8	7D	475	1,155	1,120	475	1,155	1,730	475	1,155	2,555
	14	7E	475	2,025	1,685	475	2,025	2,555	475	2,025	2,555
RCA227/68	4	7A	660	660	545	725	1,020	840	725	1,090	1,675
	4	7B	660	660	595	725	805	920	725	805	1,840
	7	7C	725	1,155	765	725	1,780	1,185	725	1,780	2,370
	8	7D	725	1,320	1,120	725	1,605	1,730	725	1,605	3,155
	14	7E	725	2,310	1,685	725	2,810	2,605	725	2,810	3,155
RCA227/97	4	7A	660	660	545	1,020	1,020	840	1,470	1,890	1,675
	4	7B	660	660	595	1,020	1,020	920	1,470	1,265	1,840
	7	7C	1,155	1,155	765	1,470	1,785	1,185	1,470	3,080	2,370
	8	7D	1,320	1,320	1,120	1,470	2,040	1,730	1,470	2,525	3,460
	14	7E	1,470	2,310	1,685	1,470	3,570	2,605	1,470	4,420	4,490
RCA229/54	4	9A	615	660	595	615	1,020	920	615	1,100	1,840
	4	9B	615	660	620	615	815	960	615	815	1,920
	9	9C	615	1,485	1,105	615	2,295	1,705	615	2,475	3,410
	8	9D	615	1,320	1,210	615	1,630	1,865	615	1,630	3,735
	18	9E	615	2,970	2,375	615	3,665	3,670	615	3,665	4,715
RCA229/68	4	9A	660	660	595	935	1,020	920	935	1,525	1,840
	4	9B	660	660	620	935	1,020	960	935	1,130	1,920
	9	9C	935	1,485	1,105	935	2,295	1,705	935	3,435	3,410
	8	9D	935	1,320	1,210	935	2,040	1,865	935	2,260	3,735
	18	9E	935	2,970	2,375	935	4,590	3,670	935	5,090	5,750
RCA229/97	4	9A	660	660	595	1,020	1,020	920	1,890	2,040	1,840
	4	9B	660	660	620	1,020	1,020	960	1,890	1,610	1,920
	9	9C	1,485	1,485	1,105	1,890	2,295	1,705	1,890	4,590	3,410
	8	9D	1,320	1,320	1,210	1,890	2,040	1,865	1,890	3,220	3,735
	18	9E	1,890	2,970	2,375	1,890	4,590	3,670	1,890	7,240	7,340

See footnotes on p. 106.

# RCA Rigid Connector Angles

## RCA Rigid Connector Angles Allowable Loads (lb.) (cont.)

Rigid Connectors

Model	No. of #10 Screws <sup>5,6</sup>	Screw Pattern	Stud Framing Thickness <sup>1</sup>								
			33 mil (20 ga.)			43 mil (18 ga.)			54 mil (16 ga.)		
			F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
RCA2211/54	4	11A	660	660	620	700	1,020	960	700	1,100	1,915
	4	11B	625	660	635	625	815	980	625	815	1,960
	11	11C	750	1,815	1,450	750	2,805	2,245	750	3,030	4,490
	8	11D	700	1,320	1,250	700	1,630	1,930	700	1,630	3,865
	22	11E	750	3,630	3,075	750	4,480	4,755	750	4,480	5,765
RCA2211/68	4	11A	660	660	620	1,020	1,020	960	1,140	1,530	1,915
	4	11B	660	660	635	1,020	1,020	980	1,140	1,130	1,960
	11	11C	1,140	1,815	1,450	1,140	2,805	2,245	1,140	4,205	4,490
	8	11D	1,140	1,320	1,250	1,140	2,040	1,930	1,140	2,260	3,865
	22	11E	1,140	3,630	3,075	1,140	5,610	4,755	1,140	6,220	7,030
RCA2211/97	4	11A	660	660	620	1,020	1,020	960	2,040	2,040	1,915
	4	11B	660	660	635	1,020	1,020	980	2,040	1,610	1,960
	11	11C	1,815	1,815	1,450	2,310	2,805	2,245	2,310	5,610	4,490
	8	11D	1,320	1,320	1,250	2,040	2,040	1,930	2,310	3,220	3,865
	22	11E	2,310	3,630	3,075	2,310	5,610	4,755	2,310	8,850	9,510
RCA333/54	3	3A	205	440	130	205	440	195	205	440	395
	4	3B	205	580	325	205	580	505	205	580	1,005
	6	3C	205	865	430	205	865	665	205	865	1,095
RCA333/68	3	3A	310	495	130	310	615	195	310	615	395
	4	3B	310	660	325	310	805	505	310	805	1,005
	6	3C	310	990	430	310	1,205	665	310	1,205	1,335
RCA333/97	3	3A	495	495	130	630	765	195	630	1,065	395
	4	3B	630	660	325	630	1,020	505	630	1,265	1,005
	6	3C	630	990	430	630	1,530	665	630	1,895	1,335
RCA335/54	2	5A	330	295	205	340	295	320	340	295	635
	4	5B	340	580	450	340	580	695	340	580	1,390
	5	5C	340	735	305	340	735	475	340	735	835
	8	5D	340	1,155	755	340	1,155	1,170	340	1,155	1,825
	10	5E	340	1,445	860	340	1,445	1,330	340	1,445	1,825
RCA335/68	2	5A	330	330	205	510	410	320	520	410	635
	4	5B	520	660	450	520	805	695	520	805	1,390
	5	5C	520	825	305	520	1,025	475	520	1,025	945
	8	5D	520	1,320	755	520	1,605	1,170	520	1,605	2,255
	10	5E	520	1,650	860	520	2,010	1,330	520	2,010	2,255
RCA335/97	2	5A	330	330	205	510	510	320	1,020	710	635
	4	5B	660	660	450	1,020	1,020	695	1,050	1,265	1,390
	5	5C	825	825	305	1,050	1,275	475	1,050	1,775	945
	8	5D	1,050	1,320	755	1,050	2,040	1,170	1,050	2,525	2,335
	10	5E	1,050	1,650	860	1,050	2,550	1,330	1,050	3,155	2,660

- As applicable, the tabulated values are calculated based on AISI RP18-4, AISI S100 or generally accepted industry standards.
- The tabulated values do not account for anchorage to the support. Anchor strength must be calculated separately and may reduce the capacity of the connection when compared to the tabulated values.
- Tabulated values do not include shear, web crippling, buckling or other local effects in the member. The designer must check member limit states separately.
- For load combinations that include F<sub>4</sub> and/or F<sub>2</sub> and/or F<sub>3</sub>, use an appropriate interaction equation.
- #10–16 screws shall have P<sub>SS</sub> ≥ 1,620 lb. Calculated values are per AISI S100. Screws must be installed with three (minimum) exposed threads.
- The number of screws is for one clip leg that is attached to the supported stud.
- In addition to calculations of net and gross section tension, F<sub>2</sub> values are also calculated and normally controlled by weak-axis bending of the anchored clip leg with the line of bending at the holes nearest the bend radius of the angle. Moment arm of ¾" is used for F<sub>2</sub> loads. The designer is responsible for calculating pullover, pullout and tension strength of the anchors and this may reduce F<sub>2</sub> strength compared to the tabulated values.
- F<sub>3</sub> strength values are computed using the plate buckling provisions of AISI RP18-4.
- For the F<sub>4</sub> strength values it's assumed that all of the connection eccentricity is taken by the screws in the supported stud. F<sub>4</sub> values are also limited by plate shear buckling per AISI RP18-4. The designer is responsible for calculating the shear capacity of the anchorage, which may reduce F<sub>4</sub> strength compared to the tabulated values.
- In addition to the limit states given in notes 7, 8 and 9, F<sub>2</sub>, F<sub>3</sub> and F<sub>4</sub> are also limited by screw shear according to the thinnest connected part of the connector and stud.
- For 50 ksi studs, 68 mil (14 ga.) and thicker, use the tabulated values for 54 mil (16 ga.) — 50 ksi studs.

## TYPICAL INTERIOR STUDS

## AISI S240-20 Eq. B3.2.5.1-1

### STUD Capacity

stud designated thickness, mil =

stud design thickness,  $t = 0.0566$  in

stud inside bend radius,  $R = 0.0849$  in

web height =  in

stud bearing length,  $N =$  in

depth of flat portion of stud web,  $h = 5.8302$  in

design yield strength,  $F_y = 50000$  psi

web crippling coefficient,  $C =$

inside bend radius coefficient,  $C_R =$

bearing length coefficient,  $C_N =$

web slenderness coefficient,  $C_h =$

$\Omega =$

$P_{nst} = 2172.3$  lbs

$P_{nst}/\Omega = 1277.8$  lbs

Beside Opening:  $P_{nst}/\Omega =$  lbs

AT DOOR JAMBS

## AISI S240-20 Eq. B3.2.5.1-2

### TRACK Capacity

stud designated thickness, mil =

design track thickness,  $t_t = 0.0451$  in

coefficient for conversion of units,  $\alpha =$

$w_{st} = 1.462$  in

tensile strength of track,  $F_{ut} = 45000$  psi

$\Omega =$

$P_{nst} = 1780.3$  lbs

$P_{nst}/\Omega = 1047.2$  lbs

Beside Opening:  $P_{nst}/\Omega =$  lbs

# SLT - Standard Slotted Leg Track

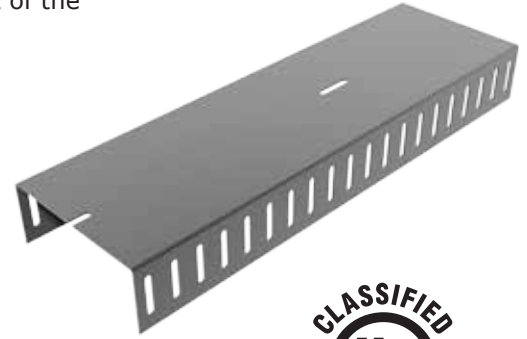
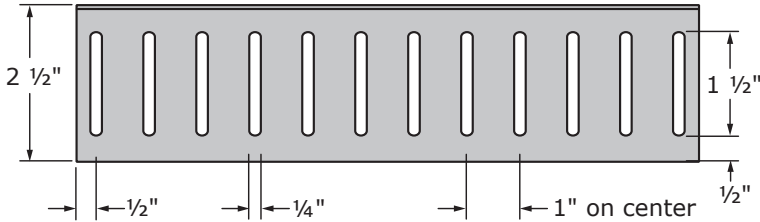
TOP TRACK

The SLT Slotted Deflection Track allows for a positive attachment of the stud to the top track through the slots designed to accommodate the vertical movement of the primary structure, in compliance with Section 713.2 of the IBC.

The SLT is designed to allow a total vertical movement of 1 1/2" (+/- 3/4").

## Dimension

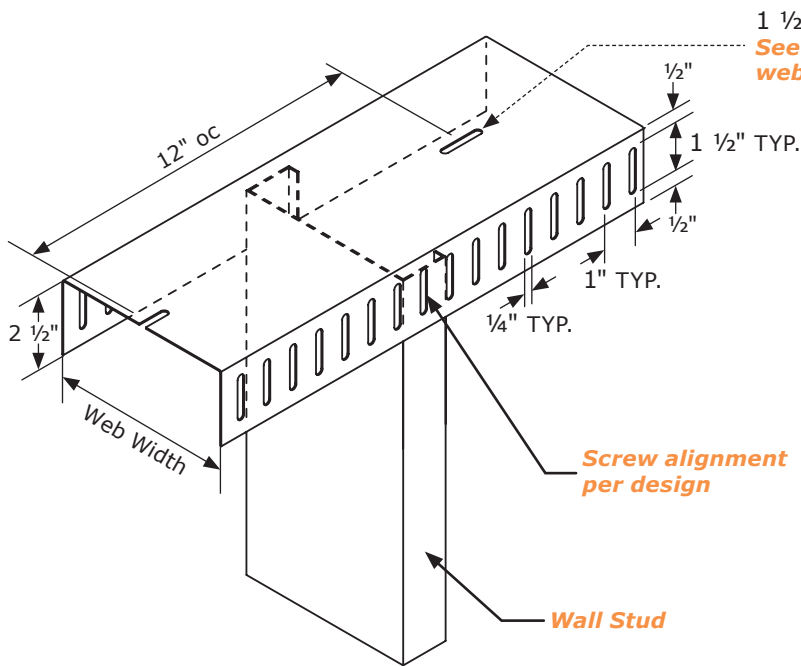
The section legs (flanges) are 2 1/2" in length and have 1 1/2" long by 1/4" wide vertical slots spaced every 1" along the length of the member.



UL Classified for US and Canada  
UL File No. R25017

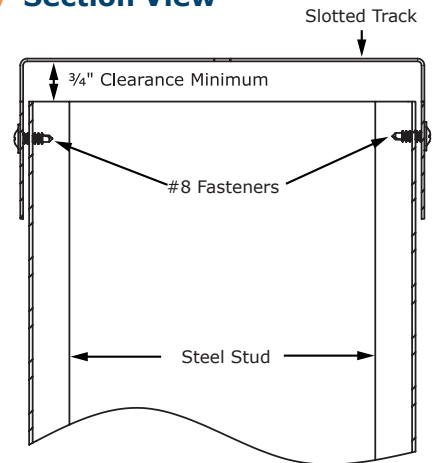
NOTE: SCAFCO DEFLECTION TRACK IS SHOWN IN CALCULATIONS — CEMCO SIMILAR

## Standard Slotted Leg Track Detail (SLT)



1 1/2" x 1/4"  
See page 3 for additional web slot configurations

## Section View



## Additional Slotted Track Styles



Slotted Angle



Slotted Rake Track



Slotted Curved Track



Slotted Pitched Track

Note: Additional styles available in both SLT and SDLT. UL Numbers do not apply to the non-standard shapes.

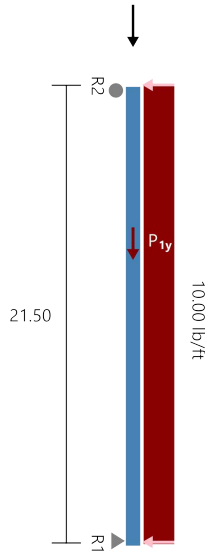
Standard Slotted Leg Track Section Properties

Part No.	Fy (ksi)	Design Thickness (in)	Gross Properties						Effective Properties		Allowable Lateral Load (lbs)
			Area (in <sup>2</sup> )	Weight (lb/ft)	Ix (in <sup>4</sup> )	Rx (in)	Iy (in <sup>4</sup> )	Ry (in)	Sxx (in <sup>2</sup> )	Ixx (in <sup>4</sup> )	
250SLT250-D20	57	0.0188	0.141	0.48	0.184	1.141	0.097	0.830	0.032	0.062	37
250SLT250-30EQD	57	0.0235	0.176	0.60	0.230	1.142	0.121	0.829	0.046	0.083	55
250SLT250-33EQS	57	0.0295	0.221	0.75	0.289	1.143	0.152	0.828	0.065	0.110	90
250SLT250-33	33	0.0346	0.259	0.88	0.339	1.144	0.178	0.827	0.087	0.129	106
250SLT250-43EQS	57	0.0400	0.300	1.02	0.393	1.145	0.205	0.826	0.100	0.149	173
250SLT250-43	33	0.0451	0.338	1.150	0.443	1.146	0.230	0.826	0.108	0.163	174
250SLT250-54	50	0.0566	0.424	1.44	0.565	1.155	0.287	0.824	0.141	0.213	344
250SLT250-68	50	0.0713	0.534	1.82	0.728	1.168	0.360	0.821	0.177	0.273	475
250SLT250-97	50	0.1017	0.761	2.59	1.086	1.195	0.506	0.815	0.249	0.399	1147
350SLT250-D20	57	0.0188	0.160	0.54	0.372	1.526	0.109	0.824	0.046	0.129	37
350SLT250-30EQD	57	0.0235	0.200	0.68	0.466	1.527	0.135	0.823	0.067	0.175	55
350SLT250-33EQS	57	0.0295	0.251	0.85	0.585	1.528	0.169	0.822	0.096	0.235	90
350SLT250-33	33	0.0346	0.294	1.00	0.687	1.528	0.198	0.821	0.138	0.286	106
350SLT250-43EQS	57	0.0400	0.340	1.16	0.794	1.529	0.229	0.820	0.153	0.331	173
350SLT250-43	33	0.0451	0.383	1.303	0.896	1.530	0.257	0.819	0.178	0.362	174
350SLT250-54	50	0.0566	0.480	1.63	1.137	1.538	0.321	0.817	0.232	0.471	344
350SLT250-68	50	0.0713	0.605	2.06	1.454	1.550	0.401	0.814	0.290	0.598	475
350SLT250-97	50	0.1017	0.862	2.93	2.139	1.575	0.563	0.808	0.409	0.867	1147
362SLT250-D20	57	0.0188	0.162	0.55	0.401	1.573	0.110	0.823	0.048	0.140	37
362SLT250-30EQD	57	0.0235	0.203	0.69	0.502	1.573	0.137	0.822	0.069	0.190	55
362SLT250-33EQS	57	0.0295	0.254	0.87	0.630	1.574	0.171	0.821	0.100	0.254	90
362SLT250-33	33	0.0346	0.298	1.01	0.740	1.575	0.200	0.820	0.144	0.312	106
362SLT250-43EQS	57	0.0400	0.345	1.17	0.856	1.576	0.231	0.819	0.159	0.359	173
362SLT250-43	33	0.0451	0.389	1.322	0.966	1.577	0.260	0.818	0.188	0.395	174
362SLT250-54	50	0.0566	0.487	1.66	1.224	1.585	0.324	0.816	0.244	0.512	344
362SLT250-68	50	0.0713	0.614	2.09	1.565	1.597	0.406	0.813	0.306	0.650	475
362SLT250-97	50	0.1017	0.875	2.98	2.300	1.621	0.570	0.807	0.432	0.942	1147
400SLT250-D20	57	0.0188	0.169	0.58	0.496	1.712	0.113	0.818	0.053	0.173	37
400SLT250-30EQD	57	0.0235	0.212	0.72	0.620	1.712	0.141	0.817	0.077	0.236	55
400SLT250-33EQS	57	0.0295	0.265	0.90	0.779	1.713	0.177	0.816	0.111	0.317	90
400SLT250-33	33	0.0346	0.311	1.06	0.914	1.714	0.207	0.815	0.162	0.396	106
400SLT250-43EQS	57	0.0400	0.360	1.22	1.058	1.715	0.238	0.814	0.179	0.450	173
400SLT250-43	33	0.0451	0.406	1.380	1.193	1.715	0.268	0.813	0.219	0.502	174
400SLT250-54	50	0.0566	0.509	1.73	1.511	1.723	0.335	0.811	0.284	0.650	344
400SLT250-68	50	0.0713	0.641	2.18	1.928	1.735	0.418	0.808	0.356	0.825	475
400SLT250-97	50	0.1017	0.913	3.11	2.823	1.758	0.587	0.802	0.502	1.192	1147
600SLT250-D20	57	0.0188	0.207	0.70	1.214	2.422	0.128	0.786	0.081	0.420	37
600SLT250-30EQD	57	0.0235	0.259	0.88	1.518	2.423	0.159	0.785	0.118	0.579	55
600SLT250-33EQS	57	0.0295	0.324	1.10	1.906	2.424	0.200	0.784	0.172	0.789	90
600SLT250-33	33	0.0346	0.380	1.29	2.236	2.424	0.233	0.783	0.260	1.021	106
600SLT250-43EQS	57	0.0400	0.440	1.50	2.595	2.425	0.269	0.782	0.293	1.145	173
600SLT250-43	33	0.0451	0.496	1.687	2.916	2.425	0.303	0.781	0.378	1.402	174
600SLT250-54	50	0.0566	0.622	2.12	3.670	2.432	0.377	0.779	0.470	1.760	344
600SLT250-68	50	0.0713	0.783	2.67	4.670	2.442	0.472	0.776	0.655	2.266	475
600SLT250-97	50	0.1017	1.116	3.80	6.767	2.462	0.662	0.770	0.960	3.253	1147
800SLT250-33EQS	57	0.0295	0.383	1.30	3.681	3.098	0.215	0.749	0.233	1.504	90
800SLT250-33	33	0.0346	0.450	1.53	4.318	3.099	0.252	0.748	0.358	1.994	106
800SLT250-43EQS	57	0.0400	0.520	1.77	4.992	3.099	0.290	0.747	0.387	2.216	173
800SLT250-43	33	0.0451	0.586	1.994	5.629	3.100	0.326	0.746	0.530	2.800	174
800SLT250-54	50	0.0566	0.735	2.50	7.090	3.106	0.407	0.744	0.671	3.522	344
800SLT250-68	50	0.0713	0.926	3.15	8.978	3.114	0.509	0.741	0.943	4.675	475
800SLT250-97	50	0.1017	1.320	4.49	12.944	3.132	0.713	0.735	1.536	6.835	1147

Table Notes

- Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.
- Gross properties based on the full section, not reduced for flange slots
- Effective properties based on a compression flange of 1/2" (before local buckling reductions) and a tension flange of 1"
- For deflection calculations, use effective Ixx
- All properties based on unpunched webs
- Web depth is equal to the nominal depth plus two times the design thickness, plus the inside bend radius
- X-X properties are 'strong-axis' properties, Y-Y properties are about the 'weak-axis'
- Effective properties based on the "North American Specification for the Design of Cold-Formed Steel Structural Members," 2001 edition with 2004 Supplement
- For SI: 1 inch = 25.4 mm, 1 ksi = 6.8948 kPa, 1 lb/ft = 14.594 N/m.

**6" STUD WALL**  
**DESIGN HT = 21'-6"**  
**LATERAL LOAD = 5 PSF**  
**DEFLECTION = L/240**



**Section :** 600S250-54 (50 ksi) @ 24" o.c. Single C Stud (punched)  
**Maxo =** 2666.7 ft-lb      **Va =** 2822.9 lb      **I =** 3.77 in<sup>4</sup>

Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations

Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexural, Distortional	Connector	Stress Ratio
Span	Sheathed, 5/8" Gypsum Sheathing, No.6 Screws	Full, 258.0"	N/A	-

**Web Crippling**

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R2	107.50	--Slip Track Design, Ref Connectors--				NO
R1	107.50	--Stud/Track Design, Ref Connectors--				NO

**Gravity Load**

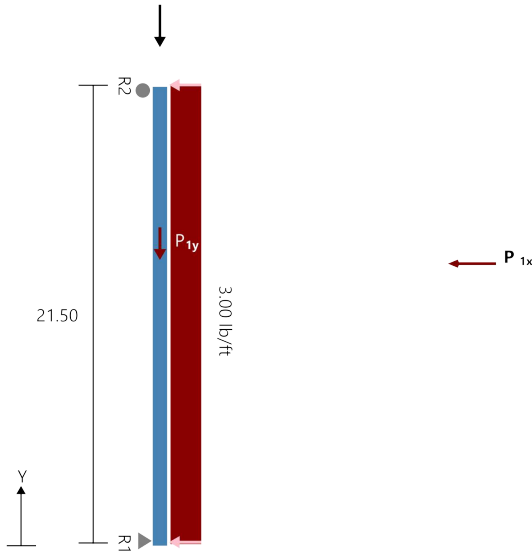
Type	Load (lb)
Uniform	10.80plf
P1y	1072.00lb @ 13.42ft

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	1304.2(c)	3777.8(c)	35%	KΦ=0.00 lb-in/in Max KL/r = 108
	Max. Shear, lbs	107.5	1947.4	6%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	577.8	2312.0	25%	Ma-dist (control), KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	577.8	2666.7	22%	
	Shear/Moment	0.22	1.00	22%	Shear 0.0, Moment 577.8
	Axial/Moment	0.60	1.00	60%	Axial 1195.1(c), Moment 575.7
	Deflection Span	L/596	-	-	-

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R2	107.5	0.0	600SLT250-43 (33) & (3) .157", 3/4" embed SST PDPA/PDPAT to 4000 nw concrete	48.86 %	42.83 %
R1	107.5	1304.2	600T125-43 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 4000 nw concrete	11.55 %	79.63 %

\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

**6" STUD WALL**  
**DESIGN HT = 21'-6"**  
**LATERAL LOAD = 1.5 PSF**  
**DEFLECTION = L/240**



**Section :** 600S250-54 (50 ksi) @ 24" o.c. Single C Stud (punched)  
**Maxo =** 2666.7 ft-lb      **Va =** 2822.9 lb      **I =** 3.77 in<sup>4</sup>

Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations

Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	Sheathed, 5/8" Gypsum Sheathing, No.6 Screws	Full, 258.0"	N/A	-

**Web Crippling**

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
P1x	192.30	1.50	1403.1	1132.2	0.33	NO
R2	152.28	--Slip Track Design, Ref Connectors--				NO
R1	104.52	--Stud/Track Design, Ref Connectors--				NO

**Gravity Load**

Type	Load (lb)
Uniform	10.80plf
P1y	683.60lb @ 13.42ft

**Point Loads P1x**  
 Load(lb) 192.30  
 Y-Dist.(ft) 13.42

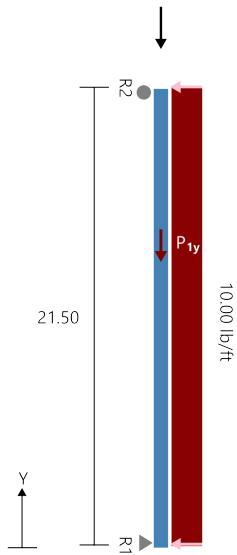
**CEILING DEAD &  
SEISMIC LOADS**

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	915.8(c)	3777.8(c)	24%	KΦ=0.00 lb-in/in Max KL/r = 108
	Max. Shear, lbs	152.3	1947.4	8%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	1132.5	2312.0	49%	Ma-dist (control), KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	1132.5	2666.7	42%	
	Shear/Moment	0.43	1.00	43%	Shear 128.1, Moment 1130.3
	Axial/Moment	0.73	1.00	73%	Axial 770.9(c), Moment 1132.2
	Deflection Span	L/369	-	-	-

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R2	152.3	0.0	600SLT250-43 (33) & (3) .157", 3/4" embed SST PDPA/PDPAT to 4000 nw concrete	69.22 %	60.67 %
R1	104.5	915.8	600T125-43 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 4000 nw concrete	11.23 %	77.42 %

\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

**6" STUD WALL**  
**DESIGN HT = 21'-6"**  
**LATERAL LOAD = 5 PSF**  
**W/ GUARDRAIL**  
**DEFLECTION = L/240**



Maxo =	2666.7 ft-lb	Va =	2822.9 lb	I =	3.77 in <sup>4</sup>
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Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations

Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Span	Sheathed, 5/8" Gypsum Sheathing, No.6 Screws	Full, 258.0"	N/A	-

**Web Crippling**

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
P1x	133.33	1.50	1403.1	868.0	0.25	NO
R2	212.43	--Slip Track Design, Ref Connectors--				NO
R1	135.90	--Stud/Track Design, Ref Connectors--				NO

**Gravity Load**

Type	Load (lb)
Uniform	10.80plf
P1y	1072.00lb @ 13.42ft

Point Loads P1x	
Load(lb)	133.33
Y-Dist.(ft)	16.92

200LB GUARDRAIL/HANDRAIL  
 LOADING DISTRIBUTED 2/3 TO  
 ONE STUD

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	1304.2(c)	3777.8(c)	35%	KΦ=0.00 lb-in/in Max KL/r = 108
	Max. Shear, lbs	212.4	1947.4	11%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	923.5	2312.0	40%	Ma-dist (control),KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	923.5	2666.7	35%	
	Shear/Moment	0.35	1.00	35%	Shear 0.0, Moment 923.5
	Axial/Moment	0.76	1.00	76%	Axial 1164.9(c), Moment 921.1
	Deflection Span	L/373	-	-	Δ= 0.6924"

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R2	212.4	0.0	600SLT250-43 (33) & (1) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	96.56 %	99.78 %
R1	135.9	1304.2	600T125-43 (33) & (2) .157", 3/4" embed SST PDPA/PDPAT to 4000 nw concrete	14.61 %	50.33 %

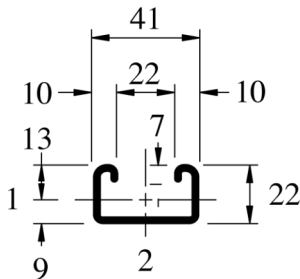
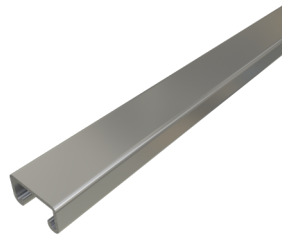
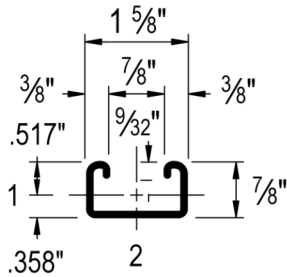
\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

## P3300 - 1-5/8" x 7/8", 12 Gauge, Solid

12 Gauge Strut Channel P3300 (solid) channel is our 12 gauge channel that is commonly used for trapeze supports, seismic bracing, ceiling grids, pipe, conduit, duct and cable tray supports, racks, and other general framing. For application examples, refer to our Application Showcase. This profile is used mainly for electrical applications because of its low profile and lower load carrying capacity. Often, a deeper profile overshoots the load capacity needs of the project.

### Features

- Product dimensions are 1 5/8" wide x 7/8" tall x 12 ga. thick, solid.
- Punched holes are also available for ease of installation
- Our P3300 is available in the following finishes: Pre-Galvanized (PG), Atkore Defender (DF), Hot-Dip Galvanized (HG), Plain (PL), Green (GR), Zinc Dichromate (ZD), Stainless Steel (SS or ST).
- UL and CSA listed
- Made in the USA



### Standard Lengths:

- **10 feet:** 10' or 10' 1/8" (3.05m) ± 1/8" (3 mm)
- **20 feet:** 20' or 20' 3/8" (6.11m) ± 1/8" (3 mm)

### Special Lengths:

- Available with a tolerance of ±1/8" (3 mm). Request quote.

### Curved Channel:

- Many Unistrut channel sections can be supplied with a curve. Click here for our ordering form, specifications, and instructions.

### Load Data:

- All beam and column load data pertains to carbon steel and stainless steel channels.
- Load tables apply only to UNISTRUT brand channel. Look for "UNISTRUT" on the product.
- Load tables and charts are constructed to be in accordance with the SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS 2007 EDITION published by the AMERICAN IRON AND STEEL INSTITUTE USING ASD METHOD.
- Loads are based on 33 ksi steel cold formed to 42 ksi.
- Safety Factor to Yield Strength is 1.67 for Beam Loads and 1.80 for Column Loads.
- Beam loads are based on a simple beam and are given as a total uniform load (W) in pounds. For proper calculation procedures, refer to our Beam Load Calculation Guide under Resources.
- For bearing loads, reference our Bearing Loads Page.

### Materials & Finishes - Standard:

- **Pregalvanized (PG):** Conforms to ASTM A653 SS GR 33, G90.
- **Unistrut Defender (DF):** Conforms to ASTM A1046 SS GR 33
- **Hot Dip Galvanized (HG):** Steel conforms to ASTM A1011 SS GR 33, Finish conforms to ASTM A123
- **Perma-Green (GR):** Steel conforms to ASTM A1011 SS GR 33, E-Coat finish
- **Perma-Gold (ZD):** Steel conforms to ASTM A1011 SS GR 33, Finish conforms to ASTM B633, Type II SC3
- **Plain (PL):** Conforms to ASTM A1011 SS GR 33

### Materials & Finishes - Special Metals:

- **Stainless Steel, Type 304 (SS):** ASTM A240, Type 304 \*
- **Stainless Steel, Type 316 (ST):** ASTM A240, Type 316 \*
- **Aluminum (EA):** ASTM B221, Type 6063-T6 (Extruded) \*

\* These materials have different physical properties and performance characteristics. Please contact us for design support.



Catalog Number	Length (ft)	Gauge	Material Type	Surface Finish	Part Weight (lb/ft)	Standard Package Qty (ft)	Standard Package Weight (lb)
P3300 10DF	10	12	Steel	Defender	1.34	500	670
P3300 10GR	10	12	Steel	Green E-Coat	1.35	500	675
P3300 10HG	10	12	Steel	Hot-Dip Galvanized	1.35	500	675
P3300 10PG	10	12	Steel	Pre-Galvanized	1.34	500	670
P3300 10PL	10	12	Steel	Plain/Oil	1.34	500	670
P3300 10SS	10	12	Stainless Steel - 304		1.35	500	675
P3300 10ST	10	12	Stainless Steel - 316		1.35	500	675
P3300 10ZD	10	12	Steel	Zinc Dichromate	1.35	500	675
P3300 20DF	20	12	Steel	Defender	1.34	1000	1340
P3300 20GR	20	12	Steel	Green E-Coat	1.34	1000	1340
P3300 20HG	20	12	Steel	Hot-Dip Galvanized	1.35	1000	1350
P3300 20PG	20	12	Steel	Pre-Galvanized	1.34	1000	1340
P3300 20PL	20	12	Steel	Plain/Oil	1.34	1000	1340
P3300 20SS	20	12	Stainless Steel - 304		1.35	1000	1350
P3300 20ST	20	12	Stainless Steel - 316		1.35	1000	1350
P3300 20ZD	20	12	Steel	Zinc Dichromate	1.34	1000	1340

Span (in)	Max Allow. Uniform Load (lbs)	Deflection at Uniform Load (in)	Uniform Loading at Deflection			Lateral Bracing Reduction Factor
			Span/180 (lbs)	Span/240 (lbs)	Span/360 (lbs)	
24	600	0.10	600	600	400	1.00
36	400	0.22	360	270	180	1.00
48	300	0.40	200	150	100	1.00
60	240	0.62	130	100	60	0.98
72	200	0.89	90	70	40	0.97
84	170	1.20	70	50	30	0.96
96	150	1.59	50	40	30	0.94
108	130	1.96	40	30	20	0.93
120	120	2.48	30	20	20	0.92

Unbraced Height (in)	Allowable Load at Slot Face (lbs)	Max Column Load Applied at C.G.			
		K=0.65 (lbs)	K=0.80 (lbs)	K=1.0 (lbs)	K=1.2 (lbs)
24	2,360	7,740	7,260	6,350	5,390
36	2,120	6,470	5,390	3,990	2,810
48	1,760	4,910	3,550	2,270	1,580
60	1,380	3,440	2,270	1,460	KL/r>200
72	1,080	2,390	1,580	KL/r>200	KL/r>200

Refer to the General Specifications for loading information.

**ALLOWABLE POINT LOAD = 0.5(600LBS) = 300LBS AT MID-POINT OK FOR GUARDRAIL/HANDRAIL LOADING BETWEEN STUDS!**

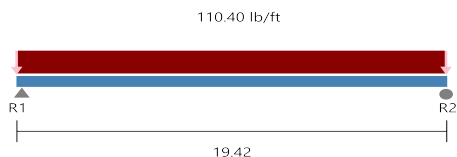
Refer to the General Specifications for loading information.

Area of Section	0.395 in <sup>2</sup> (2.5 cm <sup>2</sup> )	
	Axis 1-1	Axis 2-2
Moment of Inertia (I)	0.037 in <sup>4</sup> (1.5 cm <sup>4</sup> )	0.143 in <sup>4</sup> (6 cm <sup>4</sup> )
Section Modulus (S)	0.072 in <sup>3</sup> (1.2 cm <sup>3</sup> )	0.176 in <sup>3</sup> (2.9 cm <sup>3</sup> )
Radius of Gyration (r)	0.306 in (0.8 cm)	0.601 in (1.5 cm)

## CEILING JOIST FRAMING

**Section:** 1000S300-68 (50 ksi) @ 24" o.c. Single C Stud (punched)  
**Maxo** = 6990.9 ft-lb      **Va** = 3345.4 lb      **I** = 17.10 in<sup>4</sup>

Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations



Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexural, Distortional	Connector	Stress Ratio
Span	NA	Mid-Pt, 233.0" MSUBH3.25 (Max)		-

**Web Crippling**

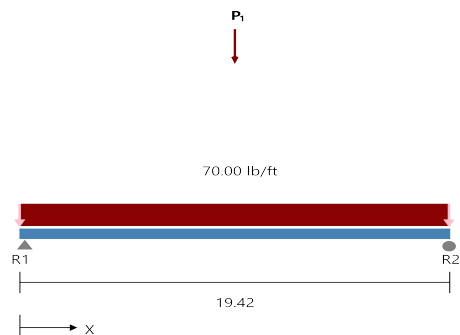
Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R1		--Shear Connection w / clip--				NO
R2		--Shear Connection w / clip--				NO

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	0.0(t)	-	0%	KΦ=0.00 lb-in/in Max KL/r = N/A
	Max. Shear, lbs	1072.0	3345.4	32%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	5204.5	5692.1	91%	Ma-dist (control), KΦ=0.00 lb-in/in
	Moment Stability, ft-lbs	5204.5	5891.8	88%	
	Shear/Moment	0.74	1.00	74%	Shear 0.0, Moment 5204.5
	Axial/Moment	0.91	1.00	91%	Axial 0.0(c), Moment 5204.5
	Deflection Span	L/333	-	-	Δ= 0.7004"

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	0.0	1072.0	MSJC8.25 Min (4#10) & (4) #10 to Carrying (14/50) (Side Attached)	62.69 %	62.69 %
R2	0.0	1072.0	MSJC8.25 Min (4#10) & (4) #10 to Carrying (14/50) (Side Attached)	62.69 %	62.69 %

\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

V<sub>max</sub> = 1072LBS  
 T<sub>max</sub> = 192LBS  
 PROVIDE (6) #14  
 SMS TO EA STUD



**Section:** 1000S300-68 (50 ksi) @ 24" o.c. Single C Stud (punched)  
**Maxo** = 6990.9 ft-lb      **Va** = 3345.4 lb      **I** = 17.10 in<sup>4</sup>

Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations

Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexural, Distortional	Connector	Stress Ratio
Span	NA	Mid-Pt, 233.0"	MSUBH3.25 (Max)	-

**Web Crippling**

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
R1		--Shear Connection w / clip--				NO
R2		--Shear Connection w / clip--				NO
P1	300.00	1.50	2087.5	4756.5	0.49	NO

**Point Loads P1**  
 Load(lb)      300.00  
 X-Dist.(ft)    9.71

	Code Check	Required	Allowed	Interaction	Notes
Span	Max. Axial, lbs	0.0(t)	-	0%	$K\Phi=0.00$ lb-in/in Max KL/r = N/A
	Max. Shear, lbs	829.7	3345.4	25%	Shear (Punched)
	Max. Moment (MaFy, Ma-dist), ft-lbs	4756.5	5692.1	84%	Ma-dist (control), $K\Phi=0.00$ lb-in/in
	Moment Stability, ft-lbs	4756.5	6039.9	79%	
	Shear/Moment	0.68	1.00	68%	Shear 150.0, Moment 4756.5
	Axial/Moment	0.84	1.00	84%	Axial 0.0(c), Moment 4756.5
	Deflection Span	L/388	-	-	$\Delta= 0.6009"$

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R1	0.0	829.7	MSJC8.25 Min (4#10) & (4) #10 to Carrying (14/50) (Side Attached)	48.52 %	48.52 %
R2	0.0	829.7	MSJC8.25 Min (4#10) & (4) #10 to Carrying (14/50) (Side Attached)	48.52 %	48.52 %

\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

# SJC Steel-Joist Connectors



This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

SJC connectors have been specifically designed for various CFS joist, rafter and underside of metal deck applications. The unique clip dimensions enable easy installation on the open side of joists and rafters with up to 3 1/2" flanges and return lips up to 3/4". For metal deck applications, the prepunched 3/8" holes easily accommodate 6", 8", 10" and 12" on-center metal deck flutes.

**Features:**

- Prepunched holes reduce installation cost by eliminating predrilling
- Intuitive fastener hole positions ensure accurate clip installation in accordance with design, support a wide range of design and application requirements and provide installation flexibility
- Angle lengths accommodate either hard-side or soft-side attachment for joists with return lips up to 3/4"
- 4 1/2" leg length enables soft-side connections for joists with flanges up to 3 1/2"
- Also accommodates kicker-to-metal deck applications

**Material:** SJC — 68 mil (50 ksi); MSJC — 97 mil (50 ksi)

**Finish:** Galvanized (G90)

**Installation:**

- Use all specified fasteners/anchors

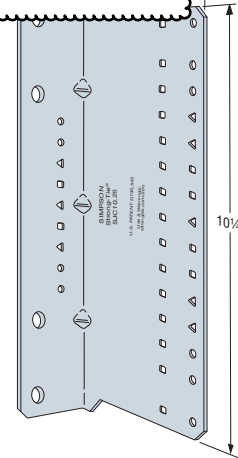
**Codes:** See p. 13 for Code Reference Key Chart

For detailed product dimensions, refer to p. 99.

## Ordering Information

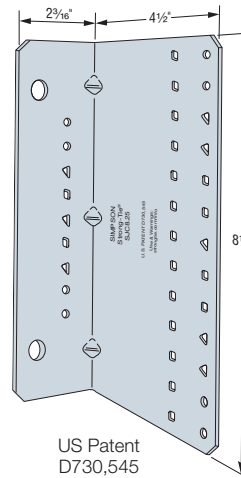
Model No.	Ordering SKU	Package Quantity
SJC8.25	SJC8.25-R15	Box of 15
MSJC8.25	MSJC8.25-R15	
SJC10.25	SJC10.25-R15	Box of 15
MSJC10.25	MSJC10.25-R15	

**CONNECTION @ CEILING JOISTS**



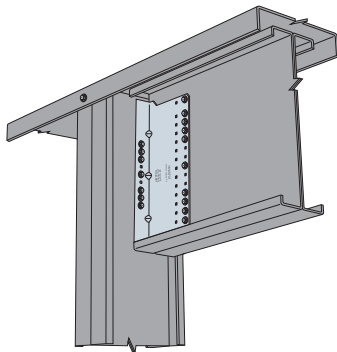
**SJC10.25**  
(MSJC10.25 similar)

Full dimensions shown on p. 99.

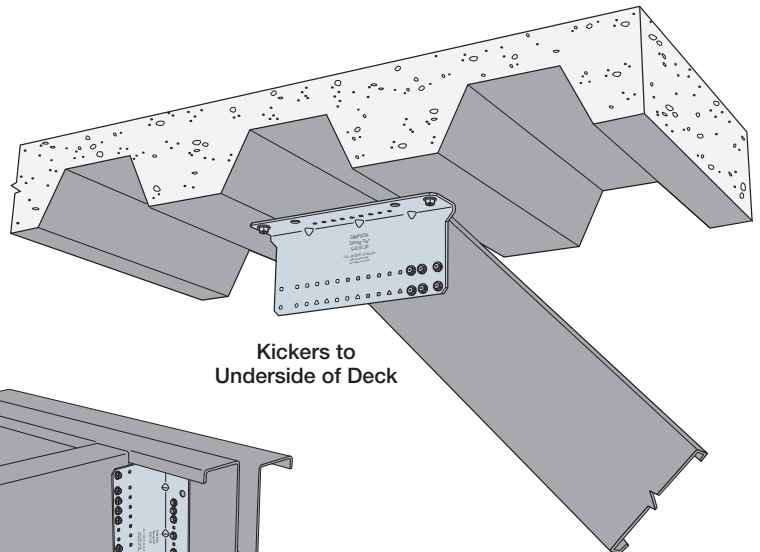


**SJC8.25**  
(MSJC8.25 similar)

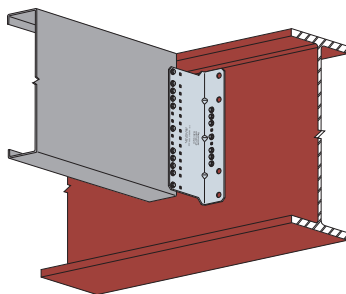
US Patent D730,545



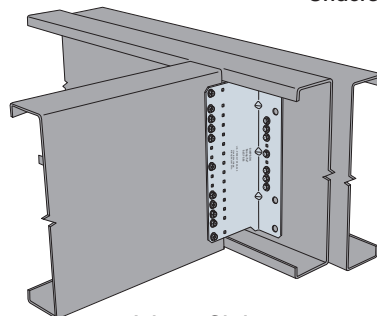
Header to Jamb



Kickers to Underside of Deck



Joists to I-Beam



Joist to Girder

Note: For 6" and 8" joists: SSC connectors are recommended.

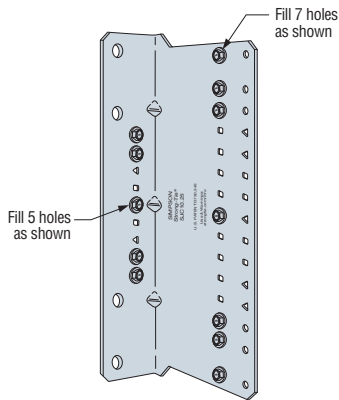
# SJC Steel-Joist Connectors

## SJC Connectors — CFS to CFS Allowable Loads (lb.)

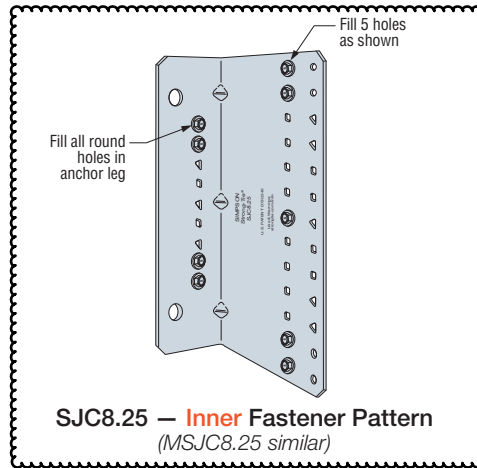
Rigid Connectors

Model No.	Connector Material Thickness mil (ga.)	Clip Length (in.)	Framing Member Depth <sup>4</sup> (in.)	Fasteners <sup>5</sup>			Allowable F <sub>4</sub> Load (lb.) <sup>2</sup>		Code Ref.	
				Pattern <sup>1</sup>	Carried Member	Carrying Member	Minimum Member Thickness			Maximum Connector Load <sup>3</sup>
							54 mil (16 ga.)	68 mil (14 ga.)		
SJC8.25	68 (14)	8¼	10	Min.	(4) #10	(4) #10	980	980	2,930	
				Max.	(9) #10	(7) #10	1,005	1,490		
				Inner	(5) #10	(4) #10	1,345	2,005		
MSJC8.25	97 (12)	8¼	10	Min.	(4) #10	(4) #10	1,005	1,710	2,930	
				Max.	(9) #10	(7) #10	1,135	1,765		
				Inner	(5) #10	(4) #10	1,535	2,220		
SJC10.25	68 (14)	10¼	12	Min.	(6) #10	(4) #10	1,170	1,625	3,935	
				Max.	(11) #10	(7) #10	1,265	1,625		
				Inner	(7) #10	(5) #10	1,620	2,170		
MSJC10.25	97 (12)	10¼	12	Min.	(6) #10	(4) #10	1,200	2,045	3,935	
				Max.	(11) #10	(7) #10	1,265	2,045		
				Inner	(7) #10	(5) #10	1,730	2,635		

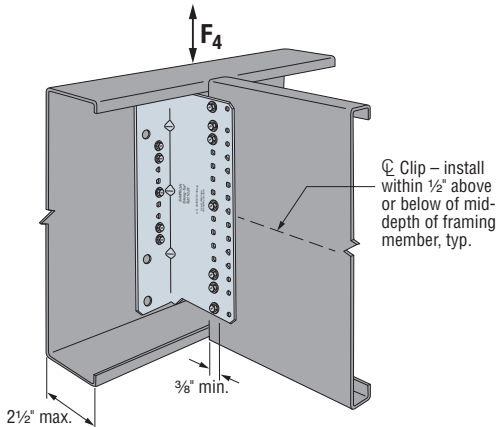
1. Min. fastener quantity and load values — fill all round holes; Max. fastener quantity and load values — fill all round and triangular holes; Inner fastener quantity and load values — see illustrations for fastener placement.
2. Allowable loads are based on bracing of the members located within 12" of the connection.
3. Maximum allowable load for connector that may not be exceeded when designing custom installations. Designer is responsible for member and fastener design.
4. For 6" and 8" joists, SSC connectors are recommended.
5. See the current *Fastening Systems* catalog at [strongtie.com](http://strongtie.com) for more information on Simpson Strong-Tie fasteners.



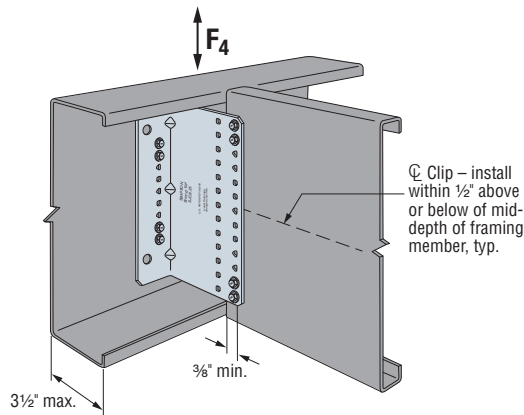
**SJC10.25 — Inner Fastener Pattern**  
(MSJC10.25 similar)



**SJC8.25 — Inner Fastener Pattern**  
(MSJC8.25 similar)



**SJC Installation with Carried Member**  
**Fasteners in Inner Row**



**SJC Installation with Carried Member**  
**Fasteners in Min. Pattern**  
(fill circle holes min. quantity,  
circle and triangle holes max. quantity)

**BSE**

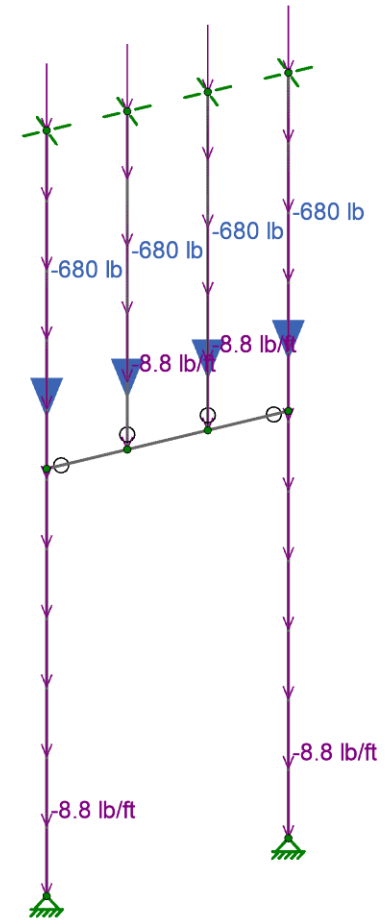
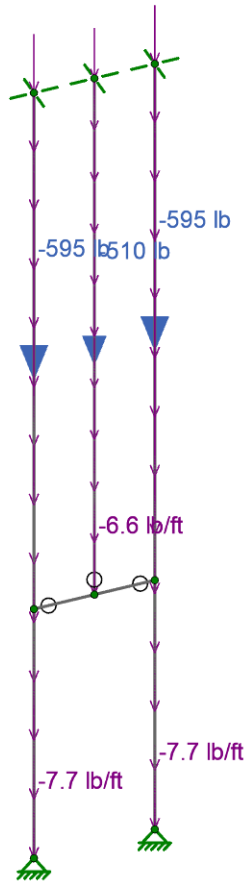
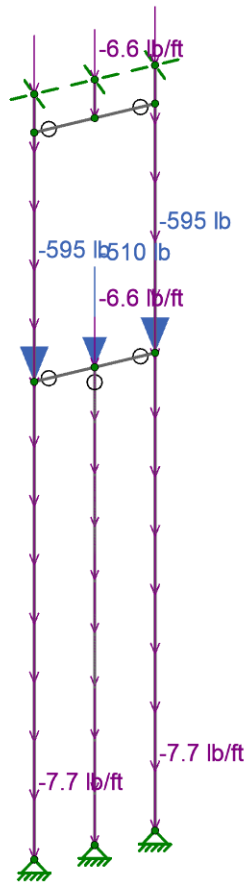
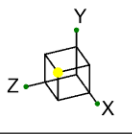
Project: \_\_\_\_\_

Date: \_\_\_\_\_

**B**rienen **S**tructural **E**ngineers, P.S.

OPENING DESIGNS





Loads: BLC 1, Dead



<Licensed Company>

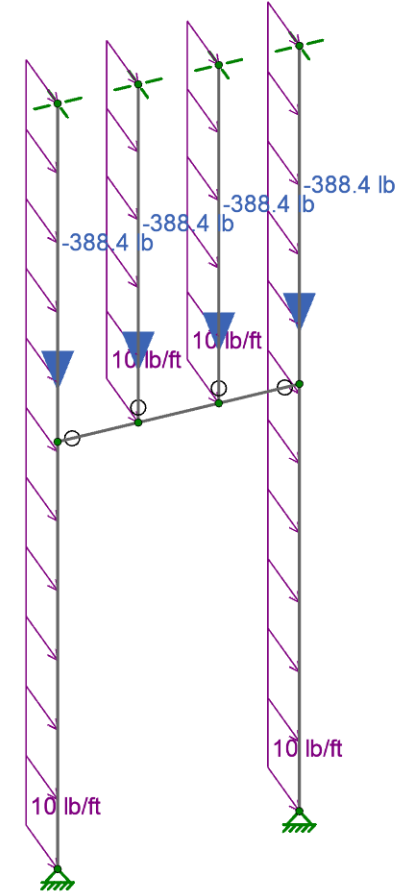
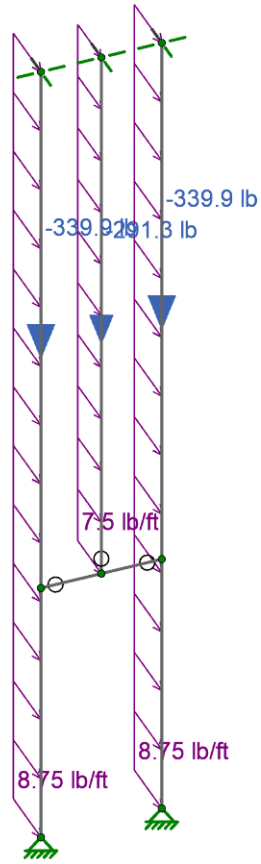
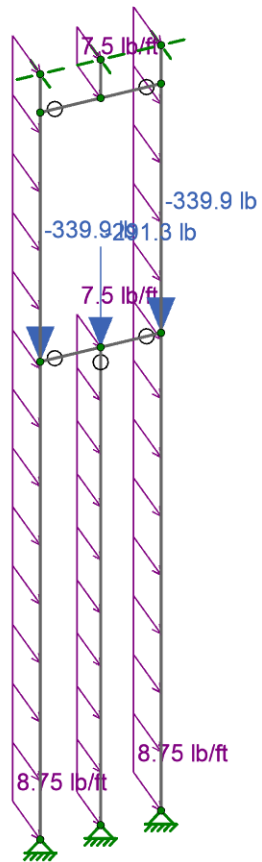
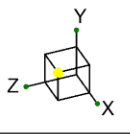
brandonb

DEAD LOADS

SK-2

Apr 14, 2026 at 10:01 PM

Centeris Row D Openings.r3d



Loads: BLC 2, Live



<Licensed Company>

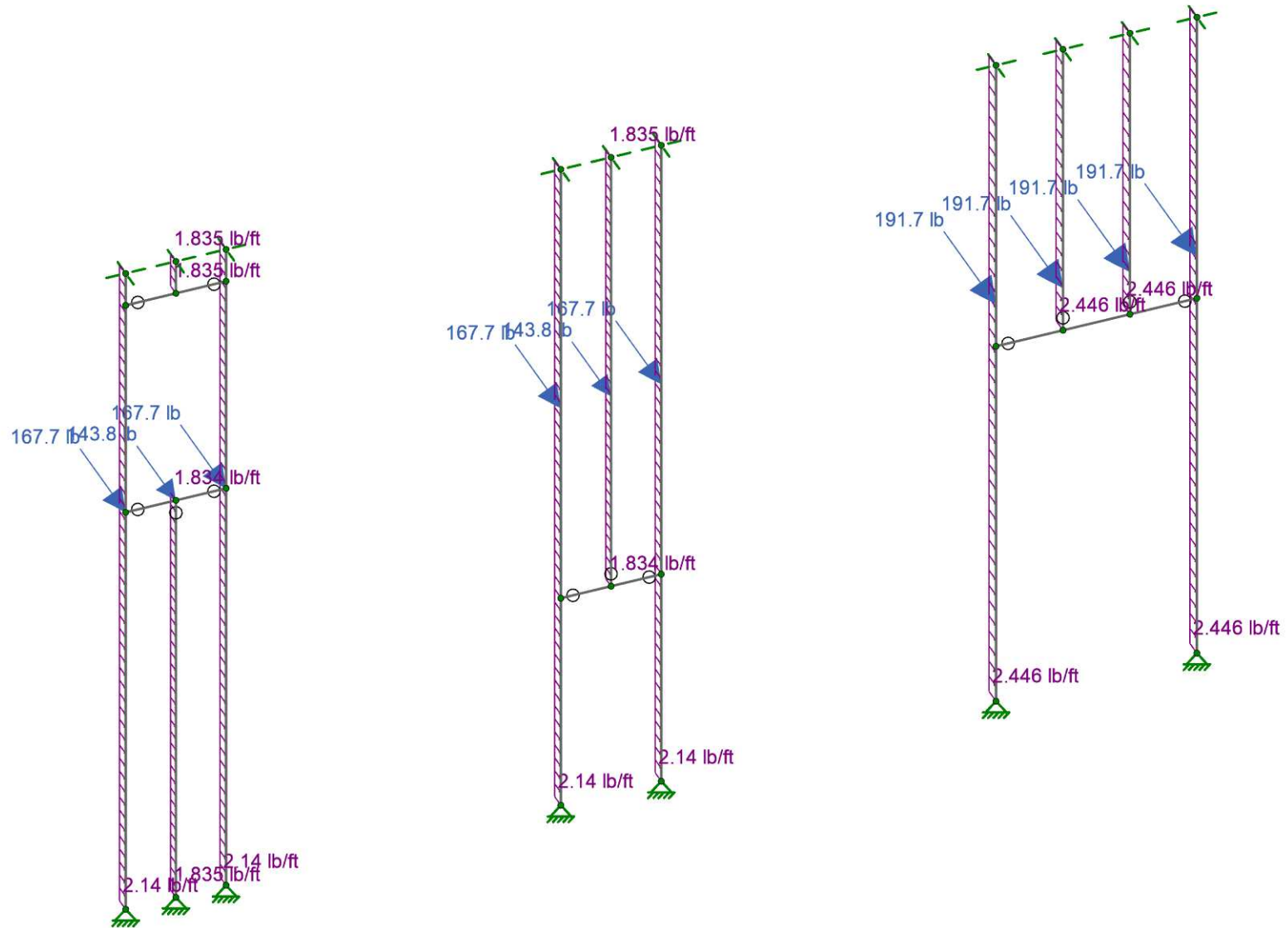
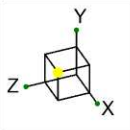
brandonb

LIVE LOADS

SK-3

Apr 14, 2026 at 10:36 PM

Centeris Row D Openings.r3d



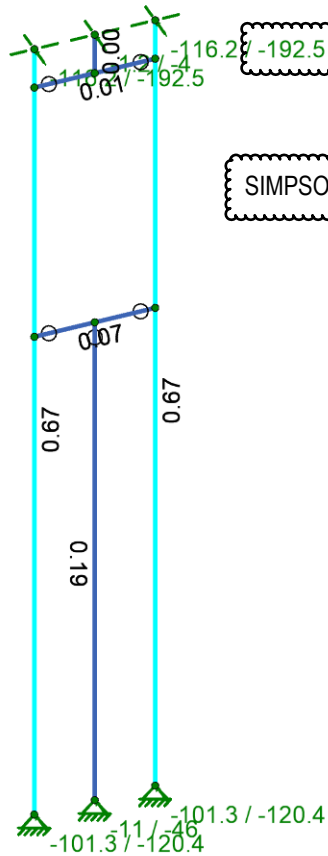
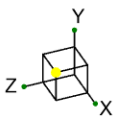
Loads: BLC 3, EQ



<Licensed Company>  
 brandonb

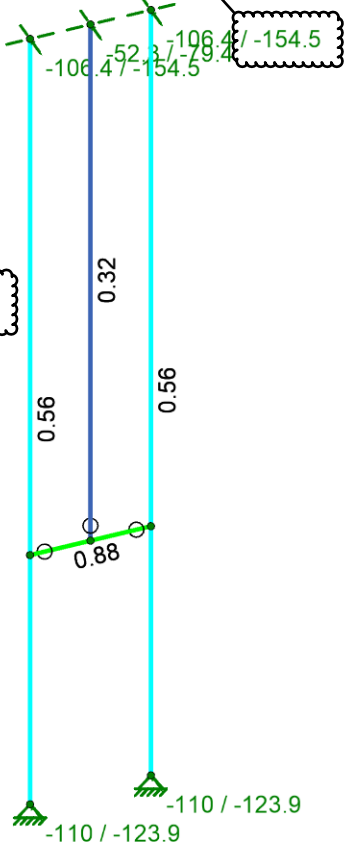
EQ LOADS

SK-4  
 Apr 14, 2026 at 10:36 PM  
 Centeris Row D Openings.r3d

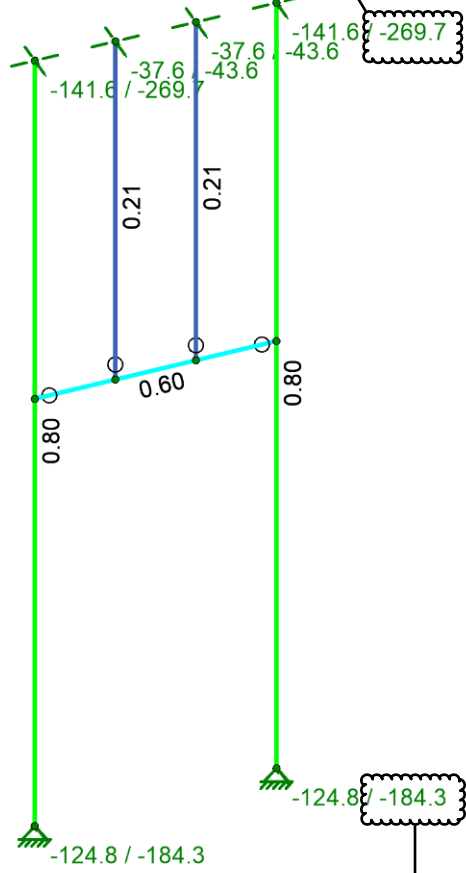


DEFLECTION TOP TRACK OK!

SIMPSON SCW5.5 @ JAMB



SIMPSON SCW5.5 @ JAMB



MAX BOTTOM TRACK REACTION OK!

Code Check (Env)

No Calc
> 1.0
.90-1.0
.75-.90
.50-.75
0-.50

Member Code Checks Displayed (Enveloped)  
Reaction and Moment Units are lbs and lb-ft (Enveloped)



<Licensed Company>  
brandonb

ENEVELOPE DESIGN RESULTS  
& SHEAR REACTIONS

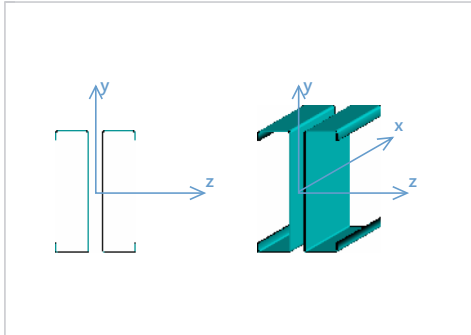
SK-5  
Apr 14, 2026 at 10:58 PM  
Centeris Row D Openings.r3d

## Detail Report: M61

6X12 DOOR JAMBS

Load Combination: Envelope

Code check: 0.804 (LC 2)



### Input Data

<b>Shape:</b>	2-600S162-54-BB	<b>I Node:</b>	N121
<b>Member Type:</b>	Beam	<b>J Node:</b>	N122
<b>Length (ft):</b>	21.5	<b>I Release:</b>	Fixed
<b>Material Type:</b>	Cold Formed Steel	<b>J Release:</b>	Fixed
<b>Design Rule:</b>	Typical	<b>I Offset:</b>	N/A
<b>Internal Sections:</b>	97	<b>J Offset:</b>	N/A
<b>Design Code:</b>	AISI S100-20: ASD	<b>T/C Only:</b>	Both Way

### Material Properties

<b>Material:</b>	A653 SS Gr50/1	<b>Nu:</b>	0.3	<b>F<sub>y</sub> (psi):</b>	50000
<b>E (ksi):</b>	29500	<b>Therm. Coeff. (/1E5 F):</b>	0.65	<b>F<sub>u</sub> (psi):</b>	65000
<b>G (ksi):</b>	11346	<b>Density (k/ft<sup>3</sup>):</b>	0.49		

### Shape Properties

<b>D (in):</b>	6	<b>I<sub>zz</sub> (in<sup>4</sup>):</b>	5.72	<b>r<sub>y</sub> (in):</b>	0.705
<b>B (in):</b>	3.25	<b>Area (in<sup>2</sup>):</b>	1.112	<b>S<sub>e,z</sub> (in<sup>3</sup>):</b>	1.907
<b>t (in):</b>	0.057	<b>J (in<sup>4</sup>):</b>	0.001	<b>S<sub>et,z</sub> (in<sup>3</sup>):</b>	1.854
<b>R (in):</b>	0.085	<b>C<sub>w</sub> (in<sup>6</sup>):</b>	5.279	<b>S<sub>f,z</sub> (in<sup>3</sup>):</b>	1.907
<b>d (in):</b>	0.5	<b>r<sub>o</sub> (in):</b>	2.375	<b>S<sub>fy,z</sub> (in<sup>3</sup>):</b>	1.907
<b>I<sub>yy</sub> (in<sup>4</sup>):</b>	0.552	<b>r<sub>z</sub> (in):</b>	2.268		

### Design Properties

<b>L<sub>b y-y</sub> (ft):</b>	6	<b>C<sub>m z-z</sub>:</b>	0.85	<b>a (ft):</b>	1
<b>L<sub>b z-z</sub> (ft):</b>	6	<b>K<sub>y-y</sub>:</b>	1	<b>Function:</b>	Lateral
<b>L<sub>comp top</sub> (ft):</b>	6	<b>K<sub>z-z</sub>:</b>	1	<b>Max Defl Ratio:</b>	L/253
<b>L<sub>comp bot</sub> (ft):</b>	6	<b>R:</b>	N/A	<b>Max Defl Location:</b>	11.198
<b>C<sub>b</sub>:</b>	1	<b>y sway:</b>	No	<b>Span:</b>	1
<b>C<sub>m y-y</sub>:</b>	0.6	<b>z sway:</b>	No		

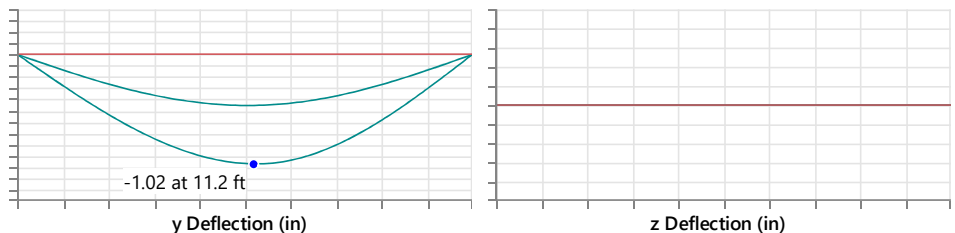
MEETS L/240 OK!

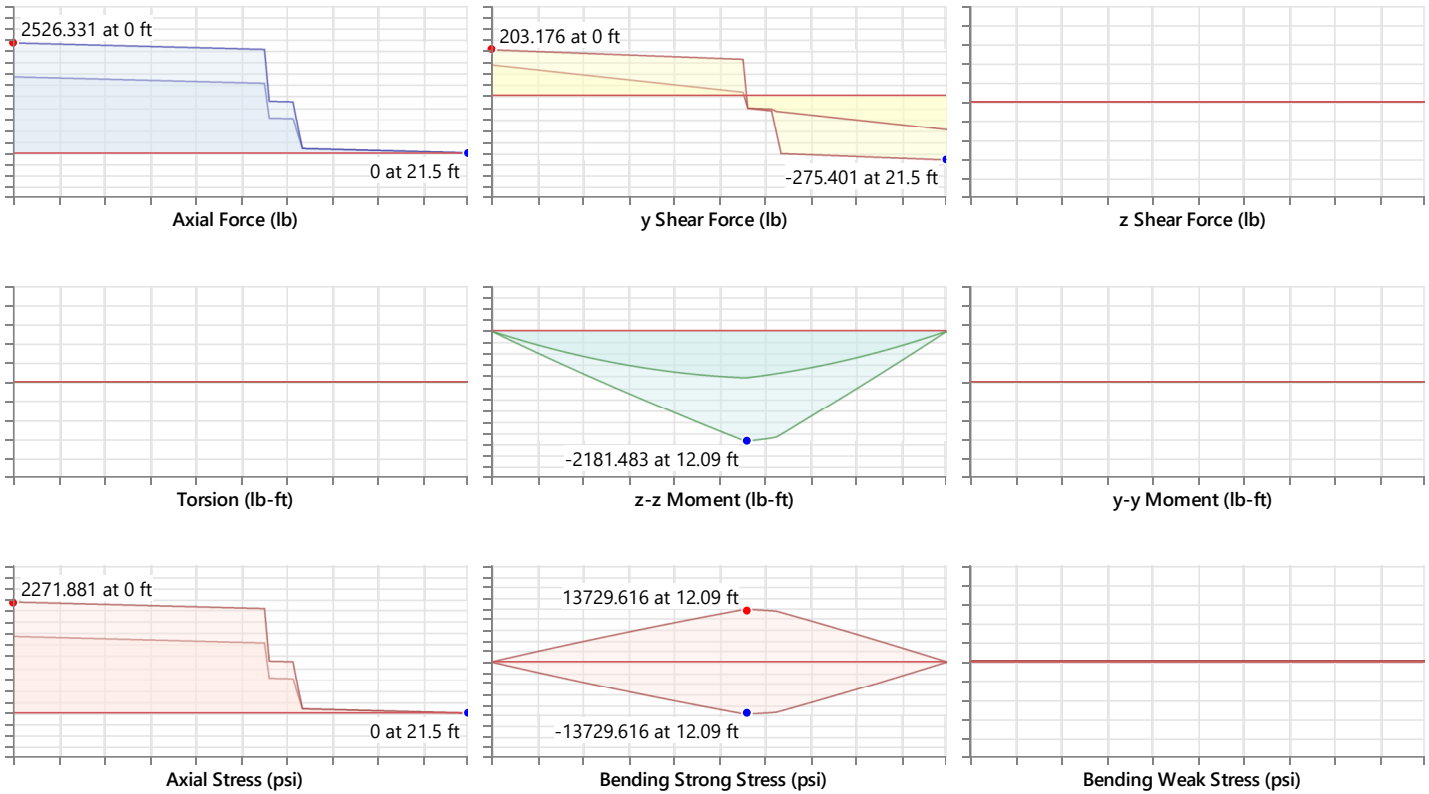
M61

N121

N122

### Diagrams:





### AISI S100-20: ASD Code Check

Combined Shape Design does not consider weak axis 'My' Moments, nor weak axis 'Vz' Forces.

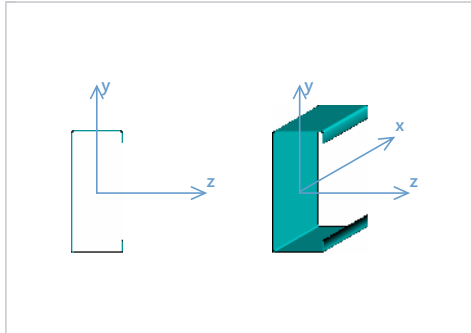
Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	2	-	-	-	-
Applied Loading - Shear + Torsion	2	-	-	-	-
Axial Tension Analysis	-	0 lb	33293.414 lb	-	-
Axial Compression Analysis	-	1600.163 lb	10481.453 lb	-	-
Flexural Analysis (Strong Axis)	-	2165.211 lb-ft	3323.064 lb-ft	-	-
Shear Analysis (Major Axis y)	-	275.401 lb	5644.578 lb	<b>0.049</b>	<b>PASS</b>
Bending & Axial Interaction Check (UC Bending Max)	-	-	-	<b>0.804</b>	<b>PASS</b>

## Detail Report: M70

3X7 DOOR JAMBS

Load Combination: Envelope

Code check: 0.673 (LC 2)



### Input Data

<b>Shape:</b>	600S250-54	<b>I Node:</b>	N139
<b>Member Type:</b>	Beam	<b>J Node:</b>	N140
<b>Length (ft):</b>	21.5	<b>I Release:</b>	Fixed
<b>Material Type:</b>	Cold Formed Steel	<b>J Release:</b>	Fixed
<b>Design Rule:</b>	Typical	<b>I Offset:</b>	N/A
<b>Internal Sections:</b>	97	<b>J Offset:</b>	N/A
<b>Design Code:</b>	AISI S100-20: ASD	<b>T/C Only:</b>	Both Way

### Material Properties

<b>Material:</b>	A653 SS Gr50/1	<b>Nu:</b>	0.3	<b>F<sub>y</sub> (psi):</b>	50000
<b>E (ksi):</b>	29500	<b>Therm. Coeff. (/1E5 F):</b>	0.65	<b>F<sub>u</sub> (psi):</b>	65000
<b>G (ksi):</b>	11346	<b>Density (k/ft<sup>3</sup>):</b>	0.49		

### Shape Properties

<b>D (in):</b>	6	<b>C<sub>w</sub> (in<sup>6</sup>):</b>	4.19	<b>S<sub>et,z</sub> (in<sup>3</sup>):</b>	1.069
<b>B (in):</b>	2.5	<b>r<sub>o</sub> (in):</b>	3.16	<b>S<sub>fz</sub> (in<sup>3</sup>):</b>	1.273
<b>t (in):</b>	0.057	<b>X<sub>c</sub> (in):</b>	0.731	<b>S<sub>fy,z</sub> (in<sup>3</sup>):</b>	1.273
<b>R (in):</b>	0.085	<b>m (in):</b>	1.129	<b>S<sub>e,y</sub> (in<sup>3</sup>):</b>	0.323
<b>d (in):</b>	0.625	<b>j (in):</b>	3.41	<b>S<sub>et,y</sub> (in<sup>3</sup>):</b>	0.323
<b>I<sub>yy</sub> (in<sup>4</sup>):</b>	0.563	<b>r<sub>z</sub> (in):</b>	2.388	<b>S<sub>fy</sub> (in<sup>3</sup>):</b>	0.323
<b>I<sub>zz</sub> (in<sup>4</sup>):</b>	3.82	<b>r<sub>y</sub> (in):</b>	0.917	<b>S<sub>fy,y</sub> (in<sup>3</sup>):</b>	0.741
<b>Area (in<sup>2</sup>):</b>	0.67	<b>x<sub>0</sub> (in):</b>	-1.86		
<b>J (in<sup>4</sup>):</b>	0.000715	<b>S<sub>e,z</sub> (in<sup>3</sup>):</b>	1.069		

### Design Properties

<b>L<sub>b y-y</sub> (ft):</b>	2	<b>C<sub>m z-z</sub>:</b>	0.85	<b>a (ft):</b>	1
<b>L<sub>b z-z</sub> (ft):</b>	2	<b>K<sub>y-y</sub>:</b>	1	<b>Function:</b>	Lateral
<b>L<sub>comp top</sub> (ft):</b>	2	<b>K<sub>z-z</sub>:</b>	1	<b>Max Defl Ratio:</b>	L/263
<b>L<sub>comp bot</sub> (ft):</b>	2	<b>R:</b>	N/A	<b>Max Defl Location:</b>	11.422
<b>C<sub>b</sub>:</b>	1	<b>y sway:</b>	No	<b>Span:</b>	1
<b>C<sub>m y-y</sub>:</b>	0.6	<b>z sway:</b>	No		

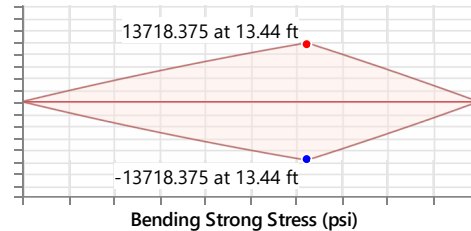
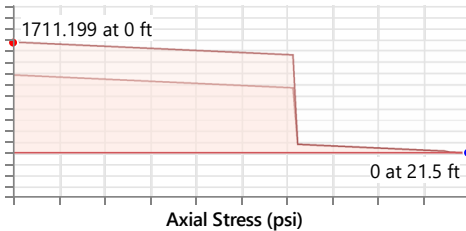
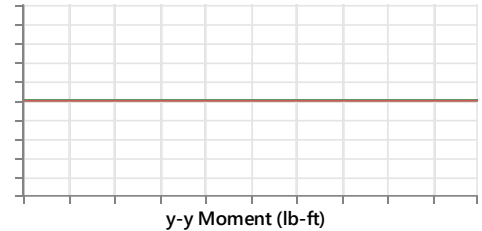
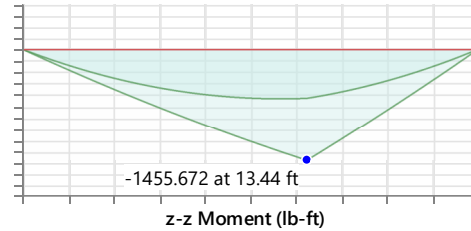
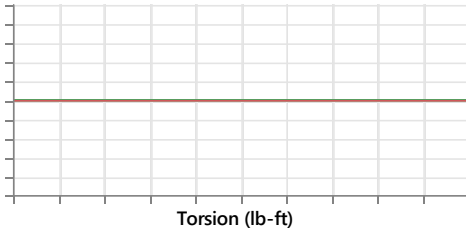
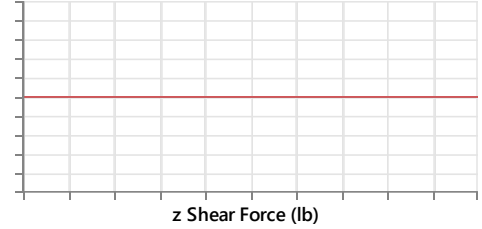
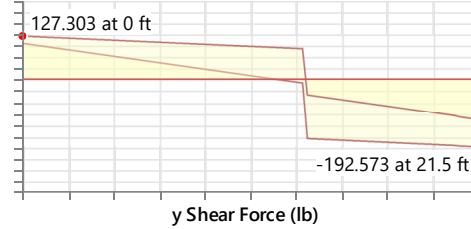
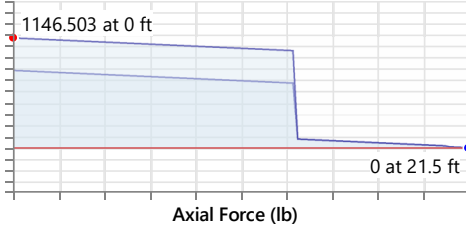
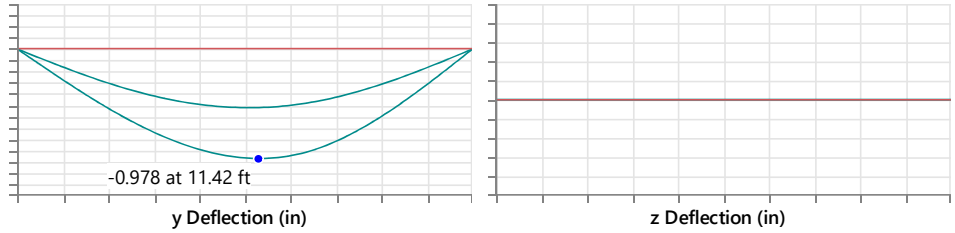
MEETS L/240 OK!

M70

N139

N140

**Diagrams:**



**AISI S100-20: ASD Code Check**

Limit State	Gov. LC	Required	Available	Unity Check	Result
Applied Loading - Bending/Axial	2	-	-	-	-
Applied Loading - Shear + Torsion	2	-	-	-	-
Axial Tension Analysis	-	0 lb	20059.879 lb	-	-
Axial Compression Analysis	-	677.404 lb	6983.644 lb	-	-
Flexural Analysis (Strong Axis)	-	1439.971 lb-ft	2372.445 lb-ft	-	-
Flexural Analysis (Weak Axis)	-	0 lb-ft	806.225 lb-ft	-	-
Shear Analysis (Major Axis y)	-	192.573 lb	2822.289 lb	<b>0.068</b>	<b>PASS</b>
Shear Analysis (Minor Axis z)	-	0 lb	4705.583 lb	<b>0</b>	<b>PASS</b>
Bending & Axial Interaction Check (UC Bending Max)	-	-	-	<b>0.673</b>	<b>PASS</b>

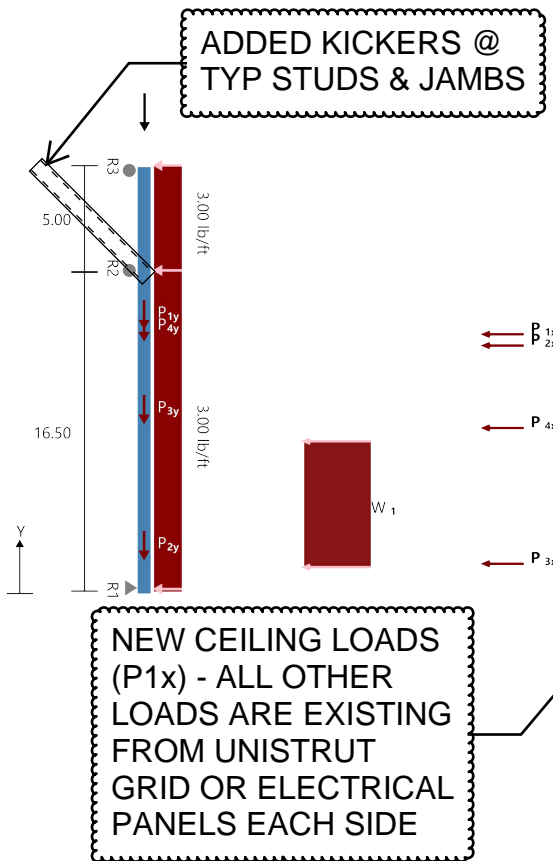
## EXISTING FRAMING REINFORCEMENT

## Abstract:

The "Data Hall" framing was originally designed to support its self weight, the electrical panels attached to each side of the wall, and unistrut grid at 13'-0" above floor finish.

With this "Row D" expansion we remove the unistrut grid on one side and provide a new 10" joist ceiling spanning 19'-5" between existing and new wall. Unfortunately this new ceiling increases our gravity and lateral load on the existing wall studs and are overstressed. To increase the existing stud design, kickers are to be installed and anchored to the concrete on metal deck above.

**EXISTING 6" STUD WALL**  
**DESIGN HT = 21'-6"**  
**LATERAL LOAD = 1.5 PSF**  
**DEFLECTION = L/240**



**Section :** 600S250-43 (33 ksi) @ 24" o.c. Single C Stud (punched)  
**Maxo =** 1511.6 ft-lb      **Va =** 1415.7 lb      **I =** 3.08 in<sup>4</sup>

Loads have not been modified for strength checks  
 Loads have not been modified for deflection calculations

Deflection Ratio = No Limit

**Bridging Connectors - Design Method = AISI S100**

Span	Axial KyLy, KtLt	Flexual, Distortional	Connector	Stress Ratio
Top	Sheathed, Sheathed	Full, 60.0"	N/A	-
Bottom	Sheathed, Sheathed	Full, 198.0"	N/A	-

**Web Crippling**

Support	Load (lb)	Bearing (in)	Pa (lb)	M (ft-lbs)	Max Int.	Stiffener?
P4x	34.22	1.50	636.6	436.1	0.20	NO
P3x	34.22	1.50	636.6	200.6	0.11	NO
P2x	66.70	1.50	636.6	253.3	0.15	NO
P1x	190.50	1.50	636.6	185.7	0.23	NO
R3	-137.96	--Slip Track Design, Ref Connectors--				NO
R2	469.98	6.00	872.0	727.3	0.59	NO
R1	117.46	--Stud/Track Design, Ref Connectors--				NO

\*\*\* after support means punched near support

**Gravity Load**

Type	Load (lb)
Uniform	10.80plf
P1y	685.30lb @ 13.58ft
P2y	246.00lb @ 1.75ft
P3y	246.00lb @ 8.75ft
P4y	240.00lb @ 13.00ft

Point Loads	P1x	P2x	P3x	P4x
Load(lb)	190.50	66.70	34.22	34.22
Y-Dist.(ft)	13.58	13.00	1.75	8.75

**Sloped/Partial Loads**

	Code Check	Y-Start (ft)	W-Start (lb/ft)	Y-End(ft)	W-End (lb/ft)	Interaction	Notes
		W1	1.50	9.13	8.00		
Top Span	Max. Axial, lbs	54.0(c)	3777.8(c)	1%	KΦ=0.00 lb-in/in Max KL/r = 26		
	Max. Shear, lbs	152.9	1240.3	12%	Shear (Punched)		
	Max. Moment (MaFy, Ma-dist), ft-lbs	727.3	1311.6	55%	Ma-dist (control), KΦ=0.00 lb-in/in		
	Moment Stability, ft-lbs	575.1	1511.6	38%			
	Shear/Moment	0.50	1.00	50%	Shear 152.9, Moment 727.3		
	Axial/Moment	0.57	1.00	57%	Axial 54.0(c), Moment 727.3		
	Deflection Span	L/2765	-	-	Δ= 0.0217"		
Bottom Span	Max. Axial, lbs	1649.5(c)	3777.8(c)	44%	KΦ=0.00 lb-in/in Max KL/r = 83		
	Max. Shear, lbs	317.0	1240.3	26%	Shear (Punched)		

Max. Moment (MaFy, Ma-dist), ft-lbs	727.3	1311.6	55%	Ma-dist (control), $K\Phi=0.00$ lb-in/in
Moment Stability, ft-lbs	437.0	1511.6	29%	
Shear/Moment	0.54	1.00	54%	Shear 317.0, Moment 727.3
Axial/Moment	0.57	1.00	57%	Axial 1320.5(c), Moment 436.4
Deflection Span	L/901	-	-	$\Delta=0.2197"$

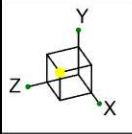
  

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R3	-138.0	0.0	600SLT250-43 (33) & (3) .157", 3/4" embed SST PDKA/PDPAT to 4000 nw concrete	62.71 %	54.97 %
R2	470.0	0.0	By Others & Anchorage Designed by Engineer	NA	NA
R1	117.5	1649.5	600T125-43 (33) & (1) .157", 3/4" embed SST PDKA/PDPAT to 4000 nw concrete	28.65 %	87.01 %

\* Reference catalog for connector and anchor requirement notes as well as screw placement requirements

$T_{max} = 470LBS$   
 $V_{max} = 470LBS$   
  
 (2)  $\emptyset 3/8" \times 3-1/2"$  KH-EZ  
 $T_a = 1094.6LBS$   
 $V_a = 909.3LBS$   
  
 $470.0 / (2 * 1094.6) +$   
 $470.0 / (2 * 909.3) = 0.47$   
  
 PROVIDE (9) #14 SMS  
 TO EA STUD  
  
 $470.0 / (6 * 144) +$   
 $470.0 / (6 * 226) = 0.89$





1735LBS AXIAL  
 PROVIDE (5) #10 SMS,  
 $V_a = 2620\text{LBS OK!}$

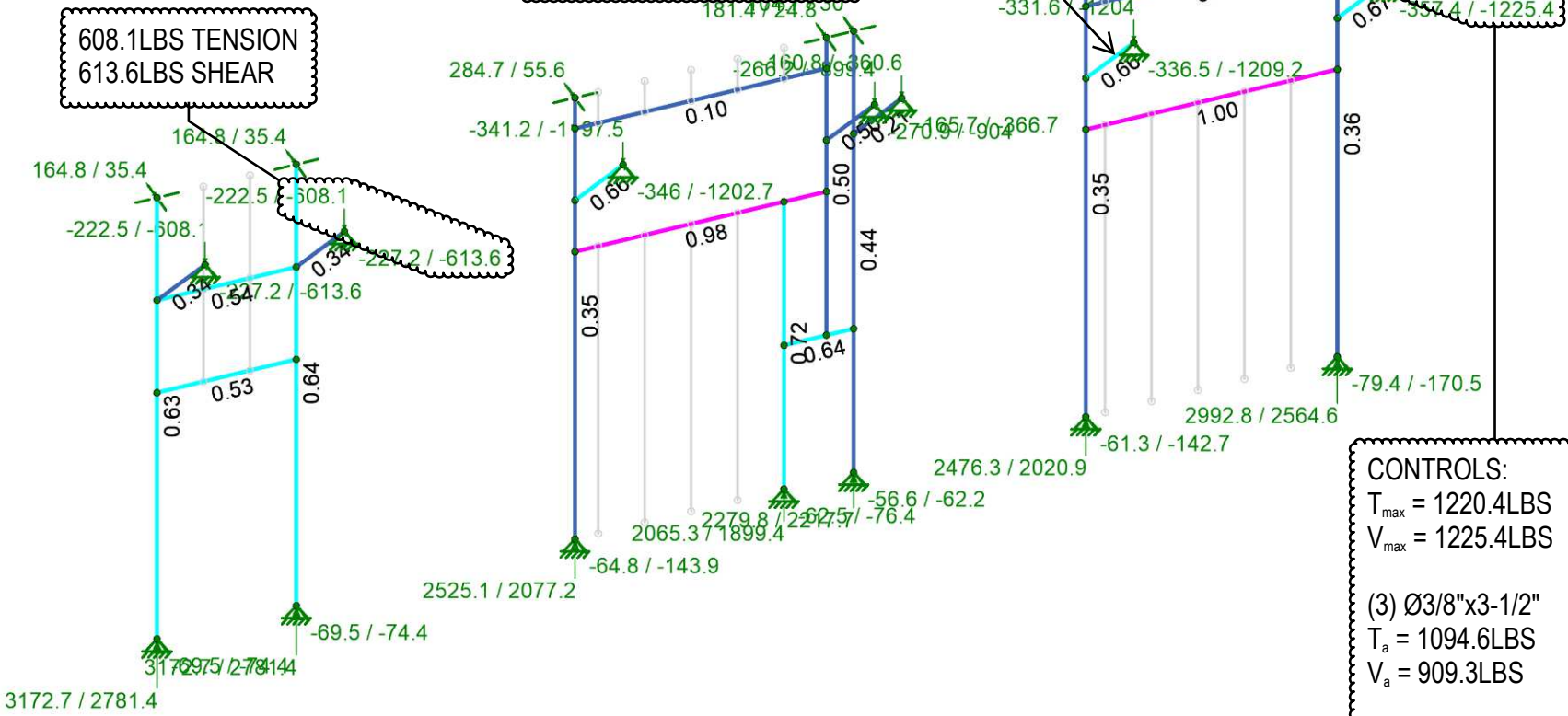
PROVIDE (10) #14 SMS TO  
 STUDS THRU GWB

$1220.4/(10 \cdot 261) +$   
 $1225.4/(10 \cdot 226) = 1.01 \text{ OK!}$

Code Check  
 (Env)

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0.-.50

608.1LBS TENSION  
 613.6LBS SHEAR



CONTROLS:

$T_{max} = 1220.4\text{LBS}$   
 $V_{max} = 1225.4\text{LBS}$

(3) Ø3/8"x3-1/2"

$T_a = 1094.6\text{LBS}$   
 $V_a = 909.3\text{LBS}$

$1220.4/(3 \cdot 1094.6) +$   
 $1225.4/(3 \cdot 909.3) = 0.82$

Member Code Checks Displayed (Enveloped)  
 Reaction and Moment Units are lbs and lb-ft (Enveloped)

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 A NEMETSCHKE COMPANY

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ENVELOPE DESIGN  
 & REACTIONS

SK-2  
 Apr 14, 2026 at 11:59 PM  
 Existing Wall Studs & Jamb.r3d