

## Fastening Options

Connections can be made using a variety of fastening options. It is critical to specify the proper fastener to ensure the proper performance of the connections in light-gauge (cold-formed) steel construction. The most common and widely used connection methods are screw connections, powder-actuated fastener connections and weld connections. Each type of connection method has various advantages and disadvantages. Therefore, we provide data for the most common types so you can choose your preferred connection method.

### SCREW CONNECTIONS

**Self-drilling screws**—These high-strength fasteners are used if the connection is multiple thicknesses of 33mil steel or thicker. One of the more common self-drilling screws is a #10-16 x 5/8 HWH SD (#10 diameter shaft, 16 threads per inch, 5/8 length, hex washer head self-drilling screw).



### AIISI CALCULATED ALLOWABLE LOADS FOR SCREW CONNECTION

Material thickness (mils)	Design thickness (in)	Material Strength		#8-18 HWH Screw		#10-16 HWH Screw		#12-14 HWH Screw		#1/4"-14 HWH Screw	
				Dia. = 0.160		Dia. = 0.190		Dia. = 0.210		Dia. = 0.240	
		F <sub>y</sub> (ksi)	F <sub>u</sub> (ksi)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)
33	0.0346	33	45	162	71	177	84	186	93	199	106
43	0.0451	33	45	241	92	263	109	277	121	296	138
54	0.0566	33	45	333	115	370	137	389	152	416	173
	0.0566	50	65	333	167	467	198	562	219	600	250
68	0.0713	33	45	—	—	467	173	550	191	588	218
	0.0713	50	65	—	—	467	249	667	276	849	315
97	0.1017	33	45	—	—	467	246	667	272	867	311
	0.1017	50	65	—	—	467	356	667	393	867	450
118	0.1242	33	45	—	—	—	—	667	333	867	380
	0.1242	50	65	—	—	—	—	667	480	867	549

### AIISI CALCULATED ALLOWABLE BEARING & PULLOVER FOR SCREWS

Material thickness (mils)	Design thickness (in)	Material Strength		#8-18 Screw		#10-16 Screw		#12-14 Screw		#1/4"-14 Screw	
				Shank = 0.160		Shank = 0.190		Shank = 0.210		Shank = 0.240	
		F <sub>y</sub> (ksi)	F <sub>u</sub> (ksi)	Bearing (lbs)	Pullover (lbs)	Bearing (lbs)	Pullover (lbs)	Bearing (lbs)	Pullover (lbs)	Bearing (lbs)	Pullover (lbs)
33	0.0346	33	45	224	195	266	292	294	292	336	389
43	0.0451	33	45	292	254	347	381	384	381	438	507
54	0.0566	33	45	367	318	436	478	481	478	550	637
		50	65	530	460	629	690	695	690	795	920
68	0.0713	33	45	—	—	549	602	606	602	693	802
		50	65	—	—	792	869	876	869	1001	1159
97	0.1017	33	45	—	—	783	858	865	858	989	1144
		50	65	—	—	1130	1239	1249	1239	1428	1653
118	0.1242	33	45	—	—	—	—	1056	1048	1207	1397
		50	65	—	—	—	—	1526	1514	1744	2018

**Notes:**

- All values were calculated using the 2001 AISI Specification w/2004 supplement.
- Charts are based on Buildex TEK2 HWH screw capacities. All screws must meet minimum criteria outlined.
- Shear strength for #8, #10, #12, and 1/4" screws must be greater than or equal to 1000 lbs, 1400 lbs, 2000 lbs and 2600 lbs respectively.
- Tension strength for #8, #10, #12, and 1/4" screws must be greater than or equal to 1545 lbs, 1936 lbs, 2778 lbs and 4060 lbs respectively.
- The minimum head diameter for #8 screws is 1/4". The minimum head diameter for #10 and #12 screws is 3/8". The minimum head diameter for 1/4" screws is 1/2".
- Screw ultimate shear capacity is based on Buildex® DATA as a minimum.
- Buildex is a registered trademark of Illinois Tool Works, Inc.

**FastClip™ deflection screws**—Many of the ClarkDietrich deflection clips include our proprietary FastClip fastener that has been specifically designed to provide friction-free deflection. These fasteners eliminate drag, binding or resistance that can often occur with common fasteners.



FastClip™ Deflection Screw	
Average Ultimate Shear	2400 lbs
NASPEC 2007 ASD Factor of Safety	3.0
Average Allowable Shear Load	800 lbs

**POWDER-ACTUATED FASTENERS**

Powder-actuated, or low-velocity driven fasteners, are commonly used to attach cold-formed steel framing members to concrete or structural steel supports. PAF pins are used for permanent attachments and are the most common type used for cold-formed construction.

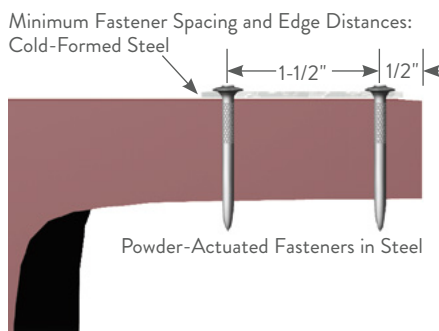
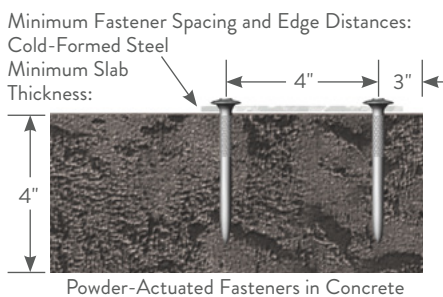


POWDER-ACTUATED FASTENERS ALLOWABLE LOADS				In normal weight concrete (lbs)											
Material thickness (mils)	Yield strength F <sub>y</sub> (ksi)	Bearing (lbs)	Pullover (lbs)	PAF (Shank Dia.=0.145", Head Dia.=0.3") Min. Embedment 3/4"						PAF (Shank Dia.=0.145", Head Dia.=0.3") Min. Embedment 1"					
				2000psi		3000psi		4000psi		2000psi		3000psi		4000psi	
				Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension
33	33	203	234	95	70	110	90	125	110	140	90	160	120	185	155
43	33	265	304	95	70	110	90	125	110	140	90	160	120	185	155
54	33	333	382	95	70	110	90	125	110	140	90	160	120	185	155
	50	480	552	95	70	110	90	125	110	140	90	160	120	185	155
68	33	418	481	95	70	110	90	125	110	140	90	160	120	185	155
	50	604	695	95	70	110	90	125	110	140	90	160	120	185	155
97	33	597	686	95	70	110	90	125	110	140	90	160	120	185	155
	50	863	992	95	70	110	90	125	110	140	90	160	120	185	155
118	33	729	838	95	70	110	90	125	110	140	90	160	120	185	155
	50	1054	1211	95	70	110	90	125	110	140	90	160	120	185	155

POWDER-ACTUATED FASTENERS ALLOWABLE LOADS				In structural steel (lbs)											
Material thickness (mils)	Yield strength F <sub>y</sub> (ksi)	Bearing (lbs)	Pullover (lbs)	PAF (Shank Dia.=0.145", Head Dia.=0.3")											
				3/16"		1/4"		3/8"		1/2"		3/4"			
				Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension		
33	33	203	234	425	455	620	800	680	810	605	850	545	500		
43	33	265	304	425	455	620	800	680	810	605	850	545	500		
54	33	333	382	425	455	620	800	680	810	605	850	545	500		
	50	480	552	425	455	620	800	680	810	605	850	545	500		
68	33	418	481	425	455	620	800	680	810	605	850	545	500		
	50	604	695	425	455	620	800	680	810	605	850	545	500		
97	33	597	686	425	455	620	800	680	810	605	850	545	500		
	50	863	992	425	455	620	800	680	810	605	850	545	500		
118	33	729	838	425	455	620	800	680	810	605	850	545	500		
	50	1054	1211	425	455	620	800	680	810	605	850	545	500		

**Notes:**

- 1 Bearing and pullover values were calculated using the 2001 AISI Specification w/2004 supplement.
- 2 See General Note #6 on page 9 for additional information.



## Fastening Options

### WELDED CONNECTIONS

**Fillet welds**—Used to make lap joints, corner joints and T-joint connections.

Weld metal is deposited in a corner formed by the fit-up of the two members and penetrates and fuses with the base metal to form the joint.

**Flare welds**—Used to join rounded or curved pieces.

- A Flare Bevel groove weld is commonly used to join a rounded or curved piece to a flat piece.
- A Flare V groove weld is commonly used to join two rounded or curved parts.

**Note:** For graphical clarity, the weld illustrations do not show the penetration of the welded material. Weld penetration is critical in determining the quality of the weld.



### AISI ALLOWABLE LOADS FOR WELDED CONNECTIONS

Material thickness (mils)	Design thickness (in)	Material Strength		Fillet Weld		Flare Groove Weld	
		F <sub>y</sub> (ksi)	F <sub>u</sub> (ksi)	Longitudinal (lbs)	Transverse (lbs)	Longitudinal (lbs)	Transverse (lbs)
Values for a single one (1) inch weld							
43	0.0451	33	45	619	864	544	663
	0.0451	50	65	895	1247	785	958
54	0.0566	33	45	822	1084	682	832
	0.0566	50	65	1188	1566	985	1202
68	0.0713	33	45	1082	1365	859	1048
	0.0713	50	65	1563	1972	1241	1514
97	0.1017	33	45	1480	1480	1226	1480
	0.1017	50	65	1480	1480	1480	1480
118	0.1242	33	45	1808	1808	1497	1808
	0.1242	50	65	1808	1808	1808	1808
Values for a single two (2) inch weld							
43	0.0451	33	45	998	1727	1087	1326
	0.0451	50	65	1442	2495	1570	1915
54	0.0566	33	45	1253	2168	1364	1664
	0.0566	50	65	1809	3131	1971	2404
68	0.0713	33	45	1578	2731	1719	2096
	0.0713	50	65	2279	3944	2483	3028
97	0.1017	33	45	2884	2961	2452	2961
	0.1017	50	65	2961	2961	2961	2961
118	0.1242	33	45	3616	3616	2994	3616
	0.1242	50	65	3616	3616	3616	3616
Values for a single three (3) inch weld							
43	0.0451	33	45	1497	2591	1631	1989
	0.0451	50	65	2163	3742	2356	2873
54	0.0566	33	45	1879	3251	2047	2496
	0.0566	50	65	2714	4697	2956	3605
68	0.0713	33	45	2367	4096	2578	3144
	0.0713	50	65	3419	5916	3724	4542
97	0.1017	33	45	3376	4441	3678	4441
	0.1017	50	65	4441	4441	4441	4441
118	0.1242	33	45	4987	5424	4491	5424
	0.1242	50	65	5424	5424	5424	5424

**Notes:**

- 1 All values were calculated using the 2001 AISI Specification w/2004 supplement (Section E2).
- 2 F<sub>xx</sub> values were based off of F<sub>xx</sub> >= 70ksi and that F<sub>xx</sub> > F<sub>u</sub>.
- 3 Values include a factor of safety that varies depending on the AISI code calculation used.
- 4 Longer weld values can be found by following the AISI Specification or by calling Technical Services at 888-437-3244; however, using multiples of lengths shown for longer welds may result in incorrect values.
- 5 Weld values listed are based on a minimum effective throat of .707 times the design thickness.