GENERAL INFORMATION

BI-FLEX®

Bi-Metal Self-Drilling Structural Screws

PRODUCT DESCRIPTION

Bi-Flex structural screws are bi-metal self-drilling tapping screws that provide the corrosion resistance of 300 series stainless steel and the efficiency of drill screws. Bi-Flex screws are suitable for use in both steel and aluminum.

GENERAL APPLICATIONS AND USES

- Steel-to-steel connections
- Aluminum-to-aluminum connections
- Aluminum-to-steel connections
- Wood-to-steel connections

FEATURES AND BENEFITS

+ High strength, ductility and reliabliity
+ Immune to hydrogen assisted stress corrosion cracking (HASCC)
+ Higher corrosion resistance compared with carbon steel and 410 series stainless steel fasteners
+ Stalgard GB coating creates greater galvanic compatibility in dissimilar metal applications, including connections involving aluminum
+ 18-8 stainless compatible with pressure treated lumber

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-4367
- Code compliant with the International Building Code/International Residential Code: 2018 IBC/IRC, 2012 IBC/IRC, and 2009 IBC/IRC
- City of Los Angeles, Supplement for 2020 LABC/LARC (in ESR-4367)
- Tested in accordance with AISI S905 and ICC-ES AC500 for attaching Miscellaneous Building Materials to Steel
- City of Los Angeles, Research Report RR 25886

GUIDE SPECIFICATIONS

05 05 23 – Metal Fastenings, 09 22 16.23 – Fasteners. Fasteners shall be Bi-Flex as supplied by Elco Construction Products, Towson, MD. Fasteners shall be installed with published instructions and the Authority Having Jurisdiction.

SECTION CONTENTS

ANCHOR MATERIALS

- 300 series (18-8) stainless head and shank and hardened steel tapping threads and drill point

DIAMETER

- #8, #10, #12
- 1/4"

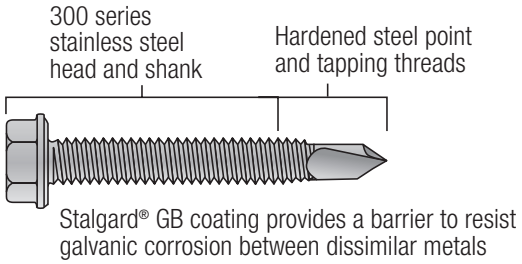
HEAD STYLES

- Hex Washer Head (HWH)
- Pan Head (PPH)
- Pancake Head (PPCKH)
- Undercut Flat Head (PUFH)
- Flat Head (PFH)

FINISH

- Stalgard GB (Galvanic Barrier) coating

CODE LISTED
ICC-ES ESR-4367
WOOD-TO-STEEL



Stalgard® GB coating provides a barrier to resist galvanic corrosion between dissimilar metals

Identification

The head marking consists of the number "3" above the ELCO® logo as shown below.

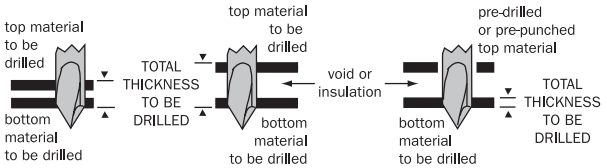
Hex Washer Head

Flat, Pan and Pancake Head

INSTALLATION SPECIFICATIONS

Point Size Selection

Maximum Combined Material Thickness By Point Type



Maximum Recommended Installation RPM

Diameter	RPM
#8	2500
#10	
#12	
#12**	1800
1/4"	

** Applies to #12 diameter screws with point type 5

Nominal Sheet Metal Sizes

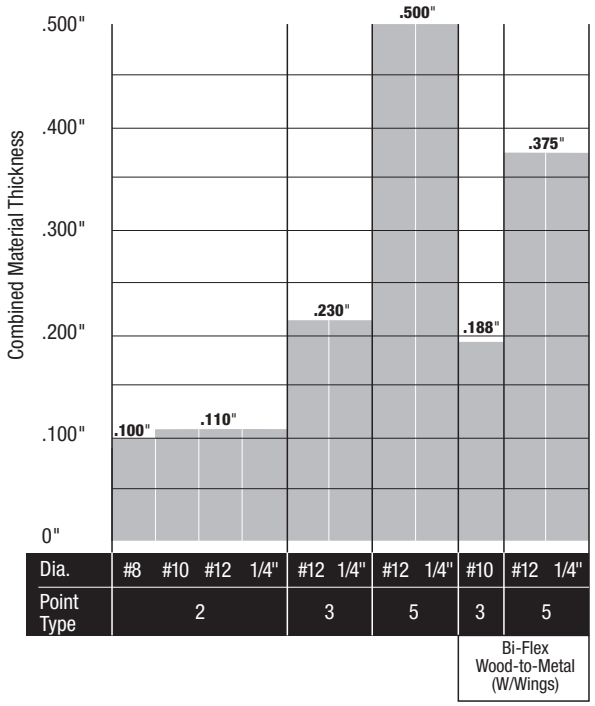
Gauge	Decimal (in.)
25	0.021
22	0.030
20	0.036
18	0.048
16	0.060
14	0.075
12	0.105

Nominal Screw Sizes

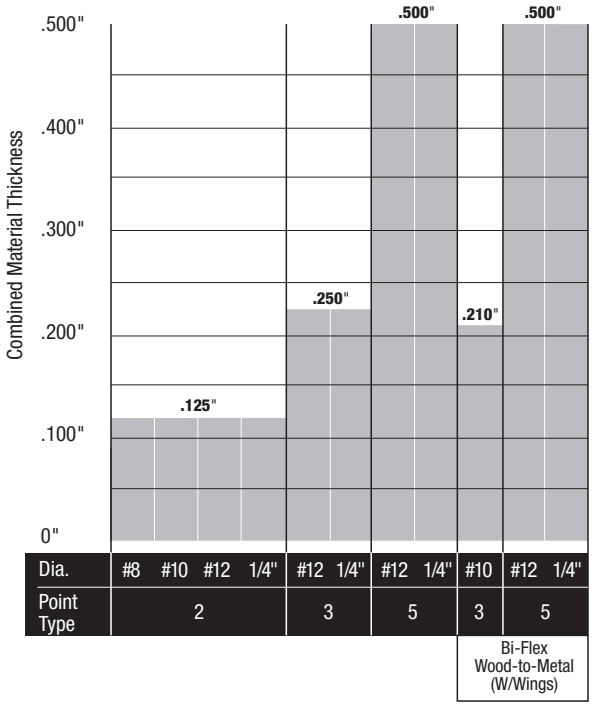
Thread Dia.	Decimal (in.)
#8	.164
#10	.190
#12	.216
1/4"	.250

Drilling and Tapping Capacity (Maximum Material Thickness)

Steel



Aluminum



PERFORMANCE DATA

Fastener Strengths[1,2,3,4,5,6,7]

Description	Head Styles	Tension (lbf)			Shear (lbf)			Minimum Torsional Strength (in-lbs)
		Ultimate	ASD	LRFD	Ultimate	ASD	LRFD	
#8-18	HWH	1,580	525	790	1,120	370	560	45
#8-18	PPH	1,375	455	685	1,045	345	520	32
#10-16	HWH	1,845	615	920	1,280	425	640	48
#10-16	PPH, PPCKH, PFH	1,755	585	875	1,405	465	700	43
#12-14	HWH	2,625	875	1,310	1,950	650	975	95
#12-14	PUFH, PPCKH	2,185	725	1,090	1,525	505	760	73
#12-24	HWH	2,730	910	1,365	2,280	760	1,140	95
#12-24	PFH	2,390	795	1,195	1,840	610	920	73
1/4"-14	HWH	3,455	1,150	1,725	2,675	890	1,335	135
1/4"-20	HWH	4,120	1,370	2,060	2,860	950	1,430	135
1/4"-20	PUFH, PFH	3,405	1,135	1,700	2,550	850	1,275	108

1. Ultimate strengths are based on laboratory tests.
2. Allowable (ASD) strengths are based on a safety factor, Ω, of 3.00 in accordance with ICC-ES AC118 and AISI S100-16.
3. Design (LRFD) strengths are based on a resistance factor, ϕ, of 0.50 in accordance with ICC-ES AC118 and AISI S100-16.
4. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.
5. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.
6. For ASD shear connections, the lower of the ASD Shear (Bearing) Capacity and the ASD Fastener Shear Strength must be used for design.
7. For LRFD shear connections, the lower of the LRFD Shear (Bearing) Capacity and the LRFD Fastener Shear Strength must be used for design.

Ultimate Shear (Bearing) Capacity of Screw Connections in Steel, lbf[1,2]

Diameter	Head Style	Steel Thickness (Lapped Sheets/Bars)					
		18-18 Ga.	16-16 Ga.	14-14 Ga.	12-12 Ga.	1/8" - 1/8"	3/16" - 3/16"
#8-18	HWH, PPH	805	-	-	-	-	-
#10-16	HWH, PPCKH, PFH	865	1,210	1,690	-	-	-
#12-14	HWH, PPCKH, PUFH	925	1,290	1,805	2,755	-	-
#12-24	HWH	925	1,290	1,805	2,755	3,280	4,920
1/4"-14	HWH	995	1,390	1,940	3,190	-	-
1/4"-20	HWH	995	1,390	1,940	3,190	3,795	5,695

1. Ultimate strengths are based on calculations in accordance with AISI S100-16.
2. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

Allowable (ASD) Shear (Bearing) Capacity of Screw Connections in Steel, lbf[1,2,3,4,5,6]

Diameter	Head Style	Steel Thickness (Lapped Sheets/Bars)					
		18-18 Ga.	16-16 Ga.	14-14 Ga.	12-12 Ga.	1/8" - 1/8"	3/16" - 3/16"
#8-18	HWH, PPH	270	-	-	-	-	-
#10-16	HWH, PPCKH, PFH	290	405	565	-	-	-
#12-14	HWH, PPCKH, PUFH	310	430	600	920	-	-
#12-24	HWH	310	430	600	920	1,095	1,640
1/4"-14	HWH	330	465	645	1,065	-	-
1/4"-20	HWH	330	465	645	1,065	1,265	1,900

1. Allowable (ASD) strengths are based on a safety factor, Ω=3.00, determined in accordance with AISI S100-16.
2. Values are based on steel members with with a minimum tensile strength of Fu = 45 ksi.
3. Allowable (ASD) Shear (Bearing) capacities for other member thicknesses may be determined by interpolating within the table.
4. For ASD shear connections, the lower of the ASD Shear (Bearing) Capacity and the ASD Fastener Shear Strength must be used for design.
5. For steel with a minimum tensile strength $F_u \geq 58$ ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength $F_u \geq 65$ ksi steel, multiply tabulated values by 1.44.
6. The first number is the thickness of steel in contact with the screw head, the second number is the thickness of the steel not in contact with the screw head.

Design (LRFD) Shear (Bearing) Capacity of Screw Connections in Steel, lbf [1,2,3,4,5,6]

Diameter	Head Styles	Steel Thickness (Lapped Sheets/ Bars)					
		18-18 Ga.	16-16 Ga.	14-14 Ga.	12-12 Ga.	1/8" - 1/8"	3/16" - 3/16"
#8-18	HWH, PPH	405	-	-	-	-	-
#10-16	HWH, PPCKH, PFH	435	605	845	-	-	-
#12-14	HWH, PPCKH, PUFH	460	645	900	1,380	-	-
#12-24	HWH	460	645	900	1,380	1,640	2,460
1/4"-14	HWH	495	695	970	1,595	-	-
1/4"-20	HWH	495	695	970	1,595	1,900	2,850

1. Design (LRFD) strengths are based on a safety factor, $\phi = 0.50$ determined in accordance with AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of $F_u = 45$ ksi.
3. Design (LRFD) Shear (Bearing) capacities for other member thicknesses may be determined by interpolating within the table.
4. For LRFD shear connections, the lower of the LRFD Shear (Bearing) Capacity and the LRFD Fastener Shear Strength must be used for design.
5. For steel with a minimum tensile strength $F_u \geq 58$ ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength $F_u \geq 65$ ksi steel, multiply tabulated values by 1.44.
6. The first number is the thickness of steel in contact with the screw head, the second number is the thickness of the steel not in contact with the screw head.

Ultimate Tension Pull-Out Capacity of Screw Connections in Steel, lbf [1,2]

Diameter	Point Type	Steel Thickness						
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"
#8-18	#2	300	335	525	855	-	-	-
#10-16	#2	275	405	475	835	-	-	-
#10-16	#3	-	370	410	745	965	1,185	-
#10-16 w/wings	#3	-	350	-	-	1,360	-	-
#12-14	#2	315	450	535	920	-	-	-
#12-14	#3	250	405	480	825	1,215	1,940	-
#12-24	#5	-	-	-	-	-	1,635	2,160
#12-24 w/wings	#5	-	350	-	-	1,140	-	1,525
1/4"-14	#2	370	530	650	1,100	-	-	-
1/4"-20	#3	-	410	470	865	1,575	2,860	-
1/4"-20 w/wings	#5	-	250	-	-	950	-	2,105
1/4"-20	#5	-	-	-	-	-	-	2,390

1. Ultimate strengths are based on laboratory tests.
2. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

Allowable Tension Pull-Out Capacity of Screw Connections in Steel, lbf [1,2,3,4,5]

Diameter	Point Type	Steel Thickness						
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"
#8-18	#2	100	110	175	285	-	-	-
#10-16	#2	90	135	160	280	-	-	-
#10-16	#3	-	125	135	250	320	395	-
#10-16 w/wings	#3	-	110	-	-	500 [6]	-	-
#12-14	#2	105	150	180	305	-	-	-
#12-14	#3	85	135	160	275	405	645	-
#12-24	#5	-	-	-	-	-	545	720
#12-24 w/wings	#5	-	90	-	-	380 [6]	-	565
1/4"-14	#2	125	175	215	365	-	-	-
1/4"-20	#3	-	135	155	290	525	955	-
1/4"-20 w/wings	#5	-	55	-	-	385 [6]	-	780
1/4"-20	#5	-	-	-	-	-	-	795

1. Unless otherwise noted, Allowable (ASD) strengths are based on a safety factor, Ω=3.00, determined in accordance with ICC-ES AC118 and AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of $F_u = 45$ ksi.
3. Allowable (ASD) pull-out capacities for other member thicknesses may be deterimined by interpolating within the table.
4. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.
5. Unless otherwise noted, for 18 gauge through 1/4" thick steel with a minimum tensile strength $F_u \geq 52$ ksi, multiply tabulated values by 1.15; when $F_u \geq 58$ ksi, multiply tabulated values by 1.29. For 18 gauge through 1/8" thick steel, when $F_u \geq 65$ ksi steel, multiply tabulated values by 1.44.
6. Allowable (ASD) strengths are based on a safety factor, Ω, determined in accordance with ICC-ES AC500 and AISI S100-16. For steel with a minimum tensile strength $F_u \geq 52$ ksi, multiply tabulated values by 1.15.

Design Tension Pull-Out Capacity of Screw Connections in Steel, lbf [1,2,3,4,5]

Diameter	Point Type	Steel Thickness						
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"
#8-18	#2	150	165	265	430	-	-	-
#10-16	#2	135	205	240	420	-	-	-
#10-16	#3	-	185	205	375	480	590	-
#10-16 w/wings	#3	-	175	-	-	800 [6]	-	-
#12-14	#2	160	225	270	460	-	-	-
#12-14	#3	125	205	240	410	610	970	-
#12-24	#5	-	-	-	-	-	820	1,080
#12-24 w/wings	#5	-	140	-	-	605 [6]	-	900
1/4"-14	#2	185	265	325	550	-	-	-
1/4"-20	#3	-	205	235	435	785	1,430	-
1/4"-20 w/wings	#5	-	90	-	-	615 [6]	-	1,245
1/4"-20	#5	-	-	-	-	-	-	1,195

1. Unless otherwise noted, Design (LRFD) strengths are based on a resistance factor, ϕ = 0.50 determined in accordance with ICC-ES AC118 and AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of F_u = 45 ksi.
3. Design (LRFD) pull-out capacities for other member thicknesses may be deterimined by interpolating within the table.
4. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.
5. Unless otherwise noted, for 18 gauge through 1/4" thick steel with a minimum tensile strength F_u ≥52 ksi, multiply tabulated values by 1.15; when F_u ≥ 58 ksi, multiply tabulated values by 1.29. For 18 gauge through 1/8" thick steel, when F_u ≥ 65 ksi steel, multiply tabulated values by 1.44.
6. Design (LRFD) strengths are based on a resistance factor, ϕ, determined in accordance with ICC-ES AC500 and AISI S100-16. For steel with a minimum tensile strength F_u ≥ 52 ksi, multiply tabulated values by 1.15.

Ultimate, Allowable (ASD), and Design (LRFD) Pull-Over Capacity of Screw Connections in Steel, lbf [1,2,3,4,5]

Diameter	Head Styles	Minimum Thickness of Steel or Framing Member in Contact with Screw Head														
		25 Gauge			22 Gauge			20 Gauge			18 Gauge			16 Gauge		
		Ult.	ASD	LRFD	Ult.	ASD	LRFD	Ult.	ASD	LRFD	Ult.	ASD	LRFD	Ult.	ASD	LRFD
#8-18	HWH	475	160	235	675	225	340	810	270	405	1,080	360	540	1,350	450	675
#8-18	PPH	445	150	220	635	210	315	760	255	380	1,015	340	505	1,265	420	635
#10-16	HWH	565	190	280	805	270	405	965	320	485	1,285	430	645	1,610	535	805
#10-16	PPCKH	615	205	310	880	295	440	1,060	355	530	1,410	470	705	1,765	590	880
#10-16	PPH	515	170	255	735	245	370	885	295	440	1,180	395	590	1,475	490	735
#12-14	HWH	585	195	295	840	280	420	1,005	335	505	1,340	445	670	1,675	560	840
#12-24	HWH	585	195	295	840	280	420	1,005	335	505	1,340	445	670	1,675	560	840
#12-14	PPCKH	615	205	310	880	295	440	1,060	355	530	1,410	470	705	1,765	590	880
1/4"-14	HWH	705	235	355	1,010	335	505	1,210	405	605	1,615	540	805	2,020	675	1,010
1/4"-20	HWH	705	235	355	1,010	335	505	1,210	405	605	1,615	540	805	2,020	675	1,010

1. Tabulated pull-over strengths were calculated in accordance with AISI S100-16. Allowable (ASD) and Design (LRFD) strengths are based on a safety factor, Ω, and resistance factor, ϕ, of 3.00 and 0.50 respectively, in accordance with AISI S100-16.
2. Pan head and pancake head fasteners do not meet the requirements of AISI S100-16. However, laboratory testing showed calculated pull-over capacities to be conservative, and thus, these capacities are reported in the table.
3. Values are based on steel with a minimum tensile strength of F_u = 45 ksi.
4. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.
5. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.

Ultimate Shear (Bearing) Capacity of Screw Connections in Aluminum, lbf [1,2]

Diameter	Head Styles	Aluminum Thickness (Lapped Sheets/Bars)											
		1/16" - 1/16"			1/16" - 1/8"			1/8" - 1/8"			1/8" - 1/4"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8-18	HWH, PPH	335	460	645	335	460	645	665	920	1,290	-	-	-
#10-16	HWH, PPCKH, PFH	390	530	745	390	530	745	780	1,065	1,495	-	-	-
#12-14	HWH, PPCKH, PUFH	445	605	850	445	605	850	890	1,215	1,700	890	1,215	1,700
#12-24	HWH	445	605	850	445	605	850	890	1,215	1,700	890	1,215	1,700
1/4"-14	HWH	515	700	980	515	700	980	1,030	1,405	1,965	1,030	1,405	1,965
1/4"-20	HWH	515	700	980	515	700	980	1,030	1,405	1,965	1,030	1,405	1,965

1. Ultimate strengths are based on calculations in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

Allowable (ASD) Shear (Bearing) Capacity of Screw Connections in Aluminum, lbf [1,2,3,4,5,6]

Diameter	Head Styles	Aluminum Thickness (Lapped Sheets/Bars)											
		1/16" - 1/16"			1/16" - 1/8"			1/8" - 1/8"			1/8" - 1/4"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8-18	HWH, PPH	115	155	215	115	155	215	220	310	430	-	-	-
#10-16	HWH, PPCKH, PFH	130	180	250	130	180	250	260	355	500	-	-	-
#12-14	HWH, PPCKH, PUFH	150	205	285	150	205	285	295	405	565	295	405	565
#12-24	HWH	150	205	285	150	205	285	295	405	565	295	405	565
1/4"-14	HWH	170	235	330	170	235	330	345	470	655	345	470	655
1/4"-20	HWH	170	235	330	170	235	330	345	470	655	345	470	655

1. Allowable (ASD) strengths are based on a safety factor, Ω =3.00, determined in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Values are based on aluminum members with the following minimum tensile strengths: 6063-T5, F_u = 22 ksi; 6063-T6, F_u = 30 ksi; 6061-T6, F_u = 42 ksi
3. The first number is the thickness of aluminum in contact with the screw head, the second number is the thickness of the aluminum not in contact with the screw head.
4. Allowable (ASD) Shear (Bearing) capacities for other member thicknesses may be determined by interpolating within the table.
5. For aluminum with the following tensile strengths: 6063-T5, F_u = 27 ksi; 6063-T6, F_u = 35 ksi; 6061-T6, F_u = 45 ksi; multiply tabulated values by 1.22, 1.16, 1.07 respectively.
6. For ASD shear connections, the lower of the ASD Shear (Bearing) Capacity and the ASD Fastener Shear Strength must be used for design.

Design (LRFD) Shear (Bearing) Capacity of Screw Connections in Aluminum, lbf [1,2,3,4,5,6]

Diameter	Head Styles	Aluminum Thickness (Lapped Sheets/Bars)											
		1/16" - 1/16"			1/16" - 1/8"			1/8" - 1/8"			1/8" - 1/4"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8-18	HWH, PPH	170	230	325	170	230	325	335	460	645	-	-	-
#10-16	HWH, PPCKH, PFH	195	265	375	195	265	375	390	535	750	-	-	-
#12-14	HWH, PPCKH, PUFH	225	305	425	225	305	425	445	610	850	445	610	850
#12-24	HWH	225	305	425	225	305	425	445	610	850	445	610	850
1/4"-14	HWH	260	350	490	260	350	490	515	705	985	515	705	985
1/4"-20	HWH	260	350	490	260	350	490	515	705	985	515	705	985

1. Design (LRFD) strengths are based on a safety factor, ϕ =0.50, determined in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Values are based on aluminum members with the following minimum tensile strengths: 6063-T5, F_u = 22 ksi; 6063-T6, F_u = 30 ksi; 6061-T6, F_u = 42 ksi
3. The first number is the thickness of aluminum in contact with the screw head, the second number is the thickness of the aluminum not in contact with the screw head.
4. Design (LRFD) Shear (Bearing) capacities for other member thicknesses may be determined by interpolating within the table.
5. For aluminum with the following tensile strengths: 6063-T5, F_u = 27 ksi; 6063-T6, F_u = 35 ksi; 6061-T6, F_u = 45 ksi; multiply tabulated values by 1.22, 1.16, 1.07 respectively.
6. For LRFD shear connections, the lower of the LRFD Shear (Bearing) Capacity and the LRFD Fastener Shear Strength must be used for design.

Ultimate, Allowable (ASD), and Design (LRFD) Tension Pull-Out Capacity of Screw Connections in Aluminum, lbf [1,2,3,4,5,6,7]

Diameter	Point Type	6063-T5 Aluminum					
		1/8"			1/4"		
		Ultimate	ASD	LRFD	Ultimate	ASD	LRFD
#8-18	#2	730	245	365	-	-	-
#10-16	#2	810	270	405	-	-	-
#10-16	#3	785	260	390	-	-	-
#12-14	#2	920	305	460	-	-	-
#12-14	#3	795	265	395	-	-	-
#12-24	#5	440	145	220	1,625	540	815
1/4"-14	#2	1,065	355	535	-	-	-
1/4"-20	#3	845	280	420	2,270	755	1,135
1/4"-20	#5	490	165	245	1,405	470	700

1. Ultimate strengths are based on laboratory tests. Allowable (ASD) and Design (LRFD) capacities are based on a safety factor, Ω = 3.00, and a resistance factor, ϕ = 0.50, respectively.
2. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).
3. Allowable (ASD) and Design (LRFD) capacities are based on 6063-T5 aluminum members with a minimum tensile strength of F_u = 22 ksi.
4. Allowable (ASD) and Design (LRFD) load capacities for other member thicknesses can be determined by interpolating within the table.
5. For ASD tension connections, the lower of the ASD tension strength, ASD pull-out strength and ASD pull-over strength must be used for design.
6. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.
7. For aluminum with a minimum tensile strength $F_u \geq$ 27 ksi, multiply tabulated values by 1.22.

Ultimate Pull-Over Capacity of Screw Connections in Aluminum, lbf[1,2]

Diameter	Head Styles	Minimum Thickness of Aluminum in Contact with Screw Head								
		1/32"			1/16"			1/8"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8 - 18	HWH	190	300	425	440	685	965	1,095	1,710	2,395
#8 - 18	PPH	180	285	400	420	655	915	1,050	1,645	2,300
#10 - 16	HWH	225	350	495	505	790	1,105	1,225	1,910	2,680
#10 - 16	PPCKH	245	380	535	540	845	1,185	1,295	2,030	2,840
#10 - 16	PPH	205	325	455	470	735	1,030	1,155	1,805	2,525
#12 - 14	HWH	230	365	510	520	810	1,140	1,255	1,960	2,745
#12 - 24	HWH	230	365	510	520	810	1,140	1,255	1,960	2,745
#12 - 14	PPCKH	245	380	535	540	845	1,185	1,295	2,030	2,840
1/4 - 14	HWH	275	430	605	605	945	1,325	1,425	2,225	3,115
1/4 - 20	HWH	275	430	605	605	945	1,325	1,425	2,225	3,115

1. Ultimate strengths are based on calculations in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Ultimate load capacities must be reduced by a minimum safety factor to determine allowable loads (ASD) or by a load resistance factor to determine strength design capacities (LRFD).

Allowable (ASD) Pull-Over Capacity of Screw Connections in Aluminum, lbf[1,2,3,4,5,6]

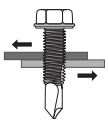
Diameter	Head Styles	Minimum Thickness of Aluminum in Contact with Screw Head								
		1/32"			1/16"			1/8"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8 - 18	HWH	65	100	140	145	230	320	365	570	800
#8 - 18	PPH	60	95	135	140	220	305	350	550	770
#10 - 16	HWH	75	120	165	170	265	370	410	640	895
#10 - 16	PPCKH	80	130	180	180	285	395	435	675	945
#10 - 16	PPH	70	110	150	155	245	345	385	600	840
#12 - 14	HWH	80	120	170	175	270	380	420	655	915
#12 - 24	HWH	80	120	170	175	270	380	420	655	915
#12 - 14	PPCKH	80	130	180	180	285	395	435	675	945
1/4 - 14	HWH	90	145	200	200	315	440	475	740	1,040
1/4 - 20	HWH	90	145	200	200	315	440	475	740	1,040

1. Allowable strengths are based on a safety factor, $\Omega = 3.00$, determined in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Values are based on aluminum members with the following minimum yield strengths: 6063-T5, $F_y = 16$ ksi; 6063-T6, $F_y = 25$ ksi; 6061-T6, $F_y = 35$ ksi
3. Allowable (ASD) pull-over capacities for other member thicknesses may be determined by interpolating within the table.
4. For aluminum with the following yield strengths: 6063-T5, $F_y = 21$ ksi; 6063-T6, $F_y = 31$ ksi; 6061-T6, $F_y = 40$ ksi; multiply tabulated values by 1.31, 1.24, 1.14 respectively.
5. Tabulated pull over capacities are applicable to aluminum that has been self drilled by the screw fastener and for pre-drilled aluminum members with clearance holes sizes of 0.177, 0.201, 0.228 and 0.266 for #8, #10, #12 and 1/4" screws, respectively.
6. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.

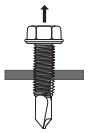
Design (LRFD) Pull-Over Capacity of Screw Connections in Aluminum, lbf[1,2,3,4,5,6]

Diameter	Head Styles	Minimum Thickness of Aluminum in Contact with Screw Head								
		1/32"			1/16"			1/8"		
		6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6	6063-T5	6063-T6	6061-T6
#8 - 18	HWH	95	150	215	220	345	485	550	855	1,200
#8 - 18	PPH	90	145	200	210	330	460	525	825	1,150
#10 - 16	HWH	115	175	250	255	395	555	615	955	1,340
#10 - 16	PPCKH	125	190	270	270	425	595	650	1,015	1,420
#10 - 16	PPH	105	165	230	235	370	515	580	905	1,265
#12 - 14	HWH	115	185	255	260	405	570	630	980	1,375
#12 - 24	HWH	115	185	255	260	405	570	630	980	1,375
#12 - 14	PPCKH	125	190	270	270	425	595	650	1,015	1,420
1/4 - 14	HWH	140	215	305	305	475	665	715	1,115	1,560
1/4 - 20	HWH	140	215	305	305	475	665	715	1,115	1,560

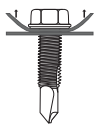
1. Design (LRFD) strengths are based on a resistance factor, $\phi = 0.50$, determined in accordance with the Aluminum Design Manual, AA ADM1-2015.
2. Values are based on aluminum members with the following minimum yield strengths: 6063-T5, $F_y = 16$ ksi; 6063-T6, $F_y = 25$ ksi; 6061-T6, $F_y = 35$ ksi
3. Design (LRFD) pull-over capacities for other member thicknesses may be determined by interpolating within the table.
4. For aluminum with the following yield strengths: 6063-T5, $F_y = 21$ ksi; 6063-T6, $F_y = 31$ ksi; 6061-T6, $F_y = 40$ ksi; multiply tabulated values by 1.31, 1.24, 1.14 respectively.
5. Tabulated pull over capacities are applicable to aluminum that has been self drilled by the screw fastener and for pre-drilled aluminum members with clearance holes sizes of 0.177, 0.201, 0.228 and 0.266 for #8, #10, #12 and 1/4" screws, respectively.
6. For LRFD tension connections, the lower of the LRFD tension strength, LRFD pull-out strength and LRFD pull-over strength must be used for design.



Lap Shear



Tension Pull-Out



Tension Pull-Over

ORDERING INFORMATION

Bi-Flex Self-Drilling Structural Screws

Cat. No. [5]	Description (Diameter- TPI x Nominal Length)	Point Type	Finish	Maximum Load-Bearing Length[1] (in.)	Minimum Protrusion Length[2] (in.)	Nominal Head Diameter[3] (in.)	Nominal Head Height[4] (in.)	Qty / Carton
#8 Diameter, 1/4" Hex Washer Head								
EAJ100	#8-18 X 3/4"	#2	Stalgard GB	0.156	19/32"	0.335	0.140	5,000
EAJ102	#8-18 X 1"	#2	Stalgard GB	0.406	19/32"	0.335	0.140	5,000
#8 Diameter, #2 Phillips Pan Head								
EAX100	#8-18 X 3/4"	#2	Stalgard GB	0.156	19/32"	0.315	0.110	5,000
EAX102	#8-18 X 1"	#2	Stalgard GB	0.406	19/32"	0.315	0.110	5,000
#10 Diameter, 5/16" Hex Washer Head								
EAJ110	#10-16 X 3/4"	#2	Stalgard GB	0.250	1/2"	0.400	0.160	5,000
EAJ120	#10-16 X 1"	#2	Stalgard GB	0.500	1/2"	0.400	0.160	5,000
EAJ140	#10-16 X 1-1/2"	#2	Stalgard GB	1.000	1/2"	0.400	0.160	2,500
#10 Diameter, #2 Phillips Pan Head								
EAX110	#10 - 16 x 3/4"	#2	Stalgard GB	0.250	1/2"	0.365	0.130	5,000
EAX120	#10 - 16 x 1"	#2	Stalgard GB	0.500	1/2"	0.365	0.130	5,000
#10 Diameter, #2 Phillips Pancake Head								
EBN300	#10 - 16 x 1"	#2	Stalgard GB	0.500	1/2"	0.435	0.075	4,000
#12 Diameter, 5/16" Hex Washer Head								
EAJ185	#12 - 14 x 1"	#2	Stalgard GB	0.406	19/32"	0.415	0.200	3,000
EAJ190	#12 - 14 x 1"	#3	Stalgard GB	0.406	19/32"	0.415	0.200	4,000
EAJ200	#12 - 14 x 1-1/4"	#3	Stalgard GB	0.656	19/32"	0.415	0.200	2,500
EAJ215	#12 - 14 x 1-1/2"	#2	Stalgard GB	0.906	19/32"	0.415	0.200	2,500
EAJ220	#12 - 14 x 1-1/2"	#3	Stalgard GB	0.906	19/32"	0.415	0.200	2,500
EAJ320	#12 - 24 x 1-1/2"	#5	Stalgard GB	0.500	1"	0.415	0.200	2,500
EAJ240	#12 - 14 x 2"	#2	Stalgard GB	1.406	19/32"	0.415	0.200	1,500
EAJ340	#12 - 24 x 2"	#5	Stalgard GB	1.000	1"	0.415	0.200	2,000
EAJ260	#12 - 14 x 2-1/2"	#3	Stalgard GB	1.906	19/32"	0.415	0.200	1,000
#12 Diameter, #3 Phillips Undercut Flat Head								
EBN200	#12 - 14 x 1"	#2	Stalgard GB	0.406	19/32"	0.415	0.090	4,000
EBN220	#12 - 14 x 1-1/4"	#2	Stalgard GB	0.656	19/32"	0.415	0.090	2,500
EBN240	#12 - 14 x 1-1/2"	#2	Stalgard GB	0.906	19/32"	0.415	0.090	2,500
#12 Diameter, #2 Phillips Pancake Head								
EBN320	#12 - 14 X 1"	#3	Stalgard GB	0.406	19/32"	0.435	0.075	4,000
1/4" Diameter, 3/8" Hex Washer Head								
EAJ415	1/4" - 14 x 1"	#2	Stalgard GB	0.406	19/32"	0.500	0.250	2,500
EAJ540	1/4" - 20 x 1"	#3	Stalgard GB	0.406	19/32"	0.500	0.250	2,500
EAJ430	1/4" - 14 x 1-1/2"	#2	Stalgard GB	0.906	19/32"	0.500	0.250	1,000
EAJ580	1/4" - 20 x 1-1/2"	#3	Stalgard GB	0.906	19/32"	0.500	0.250	1,000
EAJ600	1/4" - 20 x 1-1/2"	#5	Stalgard GB	0.500	1"	0.500	0.250	1,000
EAJ445	1/4" - 14 x 2"	#2	Stalgard GB	1.406	19/32"	0.500	0.250	1,500
EAJ610	1/4" - 20 x 2"	#3	Stalgard GB	1.406	19/32"	0.500	0.250	1,500
EAJ615	1/4" - 20 x 2"	#5	Stalgard GB	1.000	1"	0.500	0.250	1,500
EAJ640	1/4" - 20 x 2-1/2"	#3	Stalgard GB	1.906	19/32"	0.500	0.250	1,000
EAJ650 [6]	1/4" - 20 x 3"	#3	Stalgard GB	2.406	19/32"	0.500	0.250	500
EAJ630	1/4" - 20 x 3"	#5	Stalgard GB	2.000	1"	0.500	0.250	500
EAJ660 [6]	1/4" - 20 x 4"	#3	Stalgard GB	3.406	19/32"	0.500	0.250	500
EAJ670	1/4" - 20 x 4"	#5	Stalgard GB	3.000	1"	0.500	0.250	500
EAJ675 [7]	1/4" - 20 x 5"	#5	Stalgard GB	4.000	1"	0.500	0.250	250
EAJ680 [7]	1/4" - 20 x 6"	#5	Stalgard GB	5.000	1"	0.500	0.250	250
EAJ690C [8]	1/4" - 20 x 8"	#5	Stalgard GB	7.000	1"	0.500	0.250	150
1/4" Diameter, #3 Phillips Undercut Flat Head								
EBN630 [9]	1/4" - 20 x 3"	#3	Stalgard GB	2.406	19/32"	0.480	0.100	500
EBN640 [9]	1/4" - 20 x 4"	#3	Stalgard GB	3.406	19/32"	0.480	0.100	500

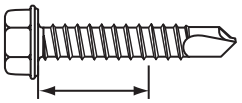
1. The Maximum Load Bearing Length is calculated by subtracting the Minimum Protrusion Length from the Nominal Length of the fastener.
2. Minimum Protrusion Length is the length that allows the hardened steel tip and lead threads to protrude out of the back side of the supporting material.
3. Nominal head diameter is the diameter of the integral washer on hex washer head fasteners.
4. Nominal head height includes the thickness of the integral washer on hex washer head fasteners.
5. Unless otherwise noted, all fasteners are fully threaded. Usable thread length is equal to the maximum load bearing length.
6. Partially threaded fastener with a usable thread length of 1.60".
7. Partially threaded fastener with a usable thread length of 2.60".
8. Partially threaded fastener with a usable thread length of 2.15".
9. Partially threaded fastener with a usable thread length of 1.35".

Bi-Flex Self-Drilling Structural Screws for Wood-to-Metal Applications

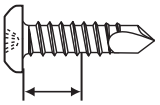
Cat. No. [3]	Description (Diameter- TPI x Nominal Length)	Point Type	Finish	Maximum Load-Bearing Length[1] (in.)	Minimum Protrusion Length[2] (in.)	Nominal Head Diameter (in.)	Qty / Carton
#10 Diameter, #2 Phillips Flat Head with Wings							
EBN140	#10 - 16 x 1-1/2"	#3	Stalgard GB	0.813	11/16"	0.370	3,500
#12 Diameter, #3 Phillips Flat Head with Wings							
EBN345	#12 - 24 x 2-13/16"	#5	Stalgard GB	1.563	1-1/4"	0.415	1,000
#8 Diameter, #3 Phillips Flat Head with Wings							
EBN645	1/4" - 20 x 2-13/16"	#5	Stalgard GB	1.563	1-1/4"	0.480	1,000

1. The Maximum Load Bearing Length is calculated by subtracting the Minimum Protrusion Length from the Nominal Length of the fastener.
2. Minimum Protrusion Length is the length that allows the hardened steel tip and lead threads to protrude out of the back side of the supporting material.
3. Unless otherwise noted, all fasteners are fully threaded. Usable thread length is equal to the maximum load bearing length.

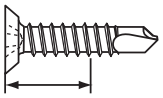
Load Bearing Area



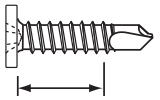
Hex Washer Head



Pan Head



Undercut Flat and Flat Head



Pancake Head

Screwguns

Cat. No.	Description	Screw Diameter
DW268	2,500 RPM VSR VERSA-CLUTCH™ Screwgun	#8 & #10
DW267	2,000 RPM VSR VERSA-CLUTCH™ Screwgun	#12 & 1/4"
DW269	1,000 RPM VSR VERSA-CLUTCH™ Screwgun	5/16"
DCF622M2	20V MAX* XR® VERSA-CLUTCH™ Adjustable Torque Screwgun Kit	#8-1/4"

For 20V MAX Maximum initial battery voltage measured without a workload is 20 volts. Nominal voltage is 18.

Fasteners must be installed perpendicular to the work surface using a maximum 2500 RPM screw gun with a torque sensing nose piece.

Guidance on installation RPM of particular screw diameters can be found on page 2.

Impact tools are not recommended for the installation of Bi-Flex fasteners.

Accessories

Cat. No.	Description
DW2046	2" Bit Tip Holder
DWA1PH2IR2	#2 Phillips Bit Tip (2 Pack)
DWA1PH3IR2	#3 Phillips Bit Tip (2 Pack)
DW2219IR	5/16" Impact Ready® Nut Driver
DW2223IR	3/8" Impact Ready® Nut Driver
DWA2SLS30	Screwdriving Set
DWA2FTS25IR	Screwdriving Set