GENERAL INFORMATION

DRIL-FLEX®

Self-Drilling Structural Screws

PRODUCT DESCRIPTION

Dril-Flex Structural Drill Screws are dual heat treated self-drilling tapping screws that provide the strength, ductility and resistance to embrittlement required for critical applications.

GENERAL APPLICATIONS AND USES

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

FEATURES AND BENEFITS

+ High-hardness point and lead threads for drilling and tapping
+ Lower-hardness load bearing area provides increased resistance to Hydrogen-Assisted Stress Corrosion Cracking when compared to case hardened fasteners
+ Stalgard and Stalgard SUB Coatings provide enhanced galvanic compatibility in dissimilar metal applications
+ Fasteners coated with Stalgard SUB finish typically show no red rust or other base metal corrosion on significant surfaces after 2000 hours of 5% neutral salt spray exposure (per ASTM B117)
+ Fasteners coated with Stalgard finish typically show no red rust or other base metal corrosion on significant surfaces after 1000 hours of 5% neutral salt spray exposure (per ASTM B117)

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES), ESR-3332
- International Code Council, Evaluation Service (ICC-ES), ESR-4367
- International Code Council, Evaluation Service (ICC-ES), ESR-4374
- Code compliant with the International Building Code/International Residential Code: 2021 IBC/IRC, 2018 IBC/IRC, 2015 IBC/IRC, and 2012 IBC/IRC
- Los Angeles Building Code (LABC) and Los Angeles Residential Code (LARC) ICC-ES Report Supplement
- Florida Building Code (FBC) ICC-ES Report Supplement
- Tested in accordance with ICC-ES AC118 for use in Steel-to-Steel Connections
- Tested in accordance with ICC-ES AC500 for attaching Miscellaneous Building Materials to Steel
- Tested in accordance with ICC-ES AC491 for use in Aluminum

GUIDE SPECIFICATIONS

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

SECTION CONTENTS

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ANCHOR MATERIALS

- Alloy Steel

HEAT TREAT

- Dual Hardened - Load Bearing Area meets SAE J429 Grade 5 and ASTM A449 Type 1 specifications

HEAD STYLES

- Hex Washer Head (HWH)
- Pan Head (PPH)
- Wafer Head (PWH)
- Undercut Flat Head (PUFH)

DIAMETER

- #10, #12
- 1/4", 5/16"

POINT DRILL TYPE

- #2, #3, #4, #5

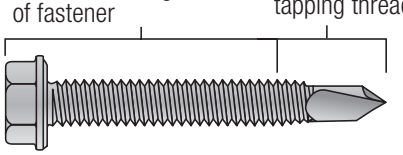
FINISH

- Stalgard SUB coating (HWH)
- Stalgard coating

CODE LISTED ICC-ES ESR-3332 STEEL-TO-STEEL

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

CODE LISTED ICC-ES ESR-4374 ALUMINUM



Hex Washer Head

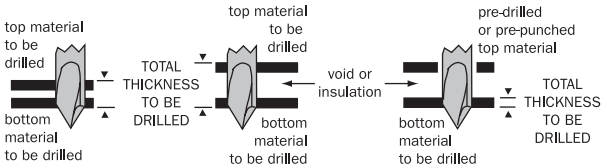
Flat, Pan and Pancake Head

DRIL-FLEX®

INSTALLATION SPECIFICATIONS

Point Size Selection

Maximum Combined Material Thickness By Point Type



Maximum Recommended Installation RPM

Diameter	RPM
#10	2500
#12	
#12**	1800
1/4"	
5/16"	1200

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

Nominal Sheet Metal Sizes

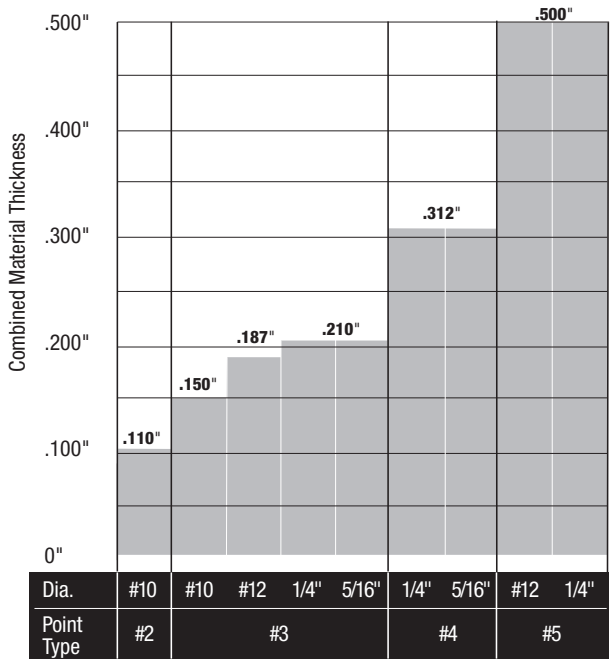
Gauge	Decimal (in.)
18	0.048
16	0.060
14	0.075
12	0.105

Nominal Screw Sizes

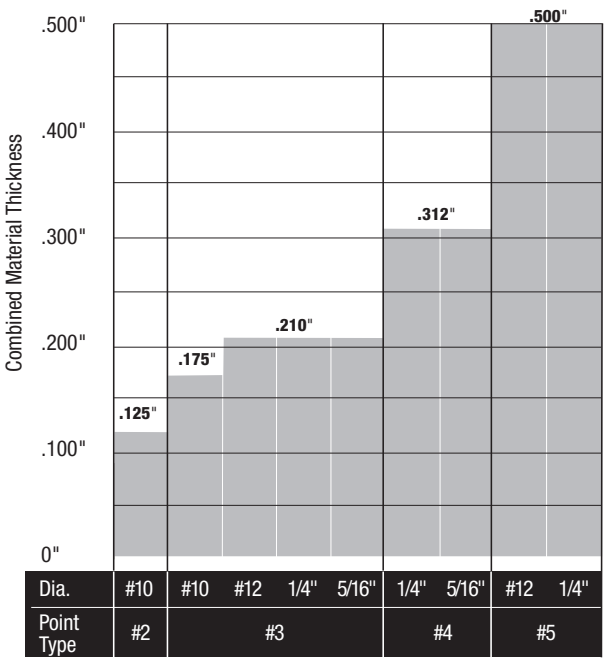
Thread Dia.	Decimal (in.)
#10	.190
#12	.216
1/4"	.250
5/16"	.3125

Drilling and Tapping Capacity (Maximum Material Thickness)

Steel



Aluminum



Minimum Screw Spacing and Edge Distance in Steel[1,2]

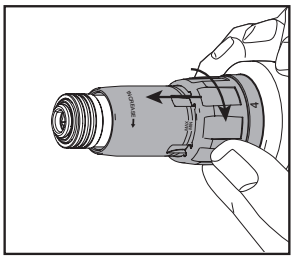
Screw Diameter: d (in.)	Minimum Spacing: 3d (in.)	Minimum Edge Distance: 1.5d (in.)	Minimum Edge Distance For Framing Members Under The 2018, 2015, and 2012 IBC: 3d (in.)
0.19 (#10)	9/16	5/16	9/16
0.216 (#12)	11/16	3/8	11/16
0.25 (1/4)	3/4	3/8	3/4
0.3125 (5/16)	15/16	1/2	15/16

1. For screws used in framing connections, when the spacing between screws is less than 3 times the nominal screws diameter, but at least 2 times the screw diameter, the allowable and design connection shear strength values must be reduced by 20 percent [Refer to Section B1.5.1.3 of AISI S240 (Section D1.5 of AISI S200 for the 2015 and 2012 IBC)].
2. For screws used in framing connections, when the edge is parallel to the direction of the applied force, the minimum edge distance may be 1.5 times the nominal screw diameter. [Refer to Section B1.5.1.3 of AISI S240 (Section D1.5 of AISI S200 for the 2015 and 2012 IBC)].

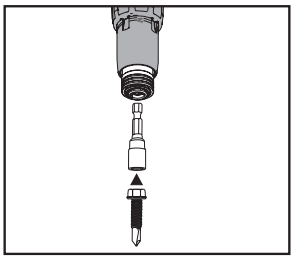
Minimum Screw Spacing and Edge Distance in Aluminum

Screw Diameter: d (in.)	Minimum Spacing: 2.5d (in.)	Minimum Edge Distance: 1.5d (in.)
0.19 (#10)	1/2	5/16
0.216 (#12)	9/16	3/8
0.25 (1/4)	5/8	3/8
0.3125 (5/16)	13/16	1/2

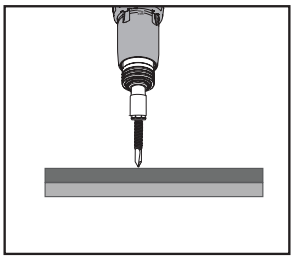
INSTALLATION PROCEDURES



Select a torque adjustable screwgun that aligns with the recommended installation RPM's of the particular fastener (DEWALT VersaClutch Screwguns are recommended). Adjust the setting on the screwgun so that the tool does not overdrive the fastener.

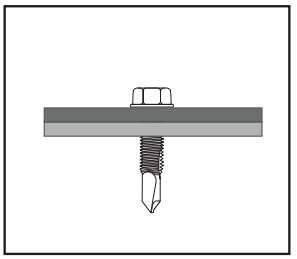


Attach an appropriate sized hex nut driver/ phillips bit to the screwgun. Mount the screw fastener head into the driver.



Place the screw fastener against the work surface. While the screw fastener is in a perpendicular position, begin driving the screw fastener into the base material.

Note: The ideal speed and pressure will depend on the characteristics of the base material as well as the screw size and point type. A trial installation is suggested to determine the optimal tool setting, speed and pressure for the material and application.



Drive the screw fastener until the head of the screw is in contact and snug tight with the work surface and/or the material being fastened.

PERFORMANCE DATA

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

Description	Tension (lbf)			Shear (lbf)			Minimum Torsional Strength (in-lbs)
	Ultimate	ASD	LRFD	Ultimate	ASD	LRFD	
#10-16	2,275	760	1,140	1,460	485	730	61
#10-24	2,610	870	1,305	1,080	360	540	65
#12-14	3,215	1,070	1,610	1,990	665	995	92
#12-14 (PUFH)	2,660	890	1,330	2,130	710	1,065	92
#12-24	4,175	1,390	2,090	2,500	835	1,250	100
1/4"-14	4,360	1,455	2,180	2,690	895	1,345	150
1/4"-20	4,590	1,530	2,295	2,615	870	1,310	156
5/16"-18	8,070	2,690	4,035	4,565	1,520	2,285	425
5/16"-24	8,755	2,920	4,380	5,470	1,825	2,735	425

1. Ultimate strengths are based on laboratory tests.
2. Allowable (ASD) strengths are based on a safety factor ,Ω, of 3.0 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	Point Type	Steel						
		18-18 Ga.	18-14 Ga.	16-16 Ga.	14-14 Ga.	1/8" - 3/16"	3/16" - 1/4"	1/4" - 12 Ga.
#10-16	#3	925	1,195	1,140	-	-	-	-
#10-16 (PPH)	#2	865	865	1,210	-	-	-	-
#10-24 (PWH)	#3	880	1,545	1,445	-	-	-	-
#12-14	#2/#3	895	1,460	1,290	1,255	-	-	-
12-14 (PUFH)	#3	880	1,648	1,304	1,688	-	-	-
#12-24	#5	785	1,650	1,285	1,750	1,705	1,985	1,620
1/4"-14	#3	950	1,595	1,310	1,665	1,610	-	-
1/4"-20	#4/#5	975	1,330	1,350	1,700	1,460	1,570	1,395
5/16"-18	#3	1,025	1,585	1,410	2,245	-	-	-
5/16"-24	#4	-	-	-	-	3,400	-	2,240

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

Diameter	Point Type	Steel						
		18-18 Ga.	18-14 Ga.	16-16 Ga.	14-14 Ga.	1/8" - 3/16"	3/16" - 1/4"	1/4" - 12 Ga.
#10-16	#3	370	395	455	-	-	-	-
#10-16 (PPH)	#2	290	290	405	-	-	-	-
#10-24 (PWH)	#3	320 [10]	570 [10]	535 [7,8,9]	-	-	-	-
#12-14	#2/#3	355	575	515	495	-	-	-
12-14 (PUFH)	#3	325 [10]	610 [10]	480 [7,8,9]	625 [7,8]	-	-	-
#12-24	#5	290 [10]	610 [10]	475 [7,8,9]	645 [7,8]	630 [7,8,9]	735 [7,8,9]	600 [7,8,9]
1/4"-14	#3	375	625	520	660	640	-	-
1/4"-20	#4/#5	385 [7,8]	525 [7,8]	535 [8]	670 [8]	595 [9]	625 [9]	555 [9]
5/16"-18	#3	410	620	560	890	-	-	-
5/16"-24	#4	-	-	-	-	1,345	985	885

1. Allowable (ASD) strengths are based on a safety factor ,Ω, 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. Unless otherwise noted, for steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength Fu ≥ 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.
7. For steel with a minimum tensile strength Fu ≥ 55 ksi, multiply tabulated values by 1.22.
8. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
9. For steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29.
10. Increasing values for higher steel tensile strength per Note 5 is not allowed.

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

Diameter	Point Type	Steel Thickness (Lapped Sheets/ Bars)						
		18-18 Ga.	18-14 Ga.	16-16 Ga.	14-14 Ga.	1/8" - 3/16"	3/16" - 1/4"	1/4" - 12 Ga.
#10-16	#3	590	630	725	-	-	-	-
#10-16 (PPH)	#2	435	435	605				
#10-24 (PWH)	#3	515	915	855	-	-	-	-
#12-14	#2/#3	570	915	820	795	-	-	-
12-14 (PUFH)	#3	520 [10]	975 [10]	770 [7,8,9]	1,000 [7,8]	-	-	-
#12-24	#5	465 [10]	976 [10]	760 [7,8,9]	1,035 [7,8]	1,010 [7,8,9]	1,175 [7,8,9]	960 [7,8,9]
1/4"-14	#3	605	1,000	835	1,060	1,020	-	-
1/4"-20	#4/#5	615 [7,8]	840 [7,8]	850 [8]	1,070 [8]	950 [9]	1,000 [9]	885 [9]
5/16"-18	#3	655	995	895	1,425	-	-	-
5/16"-24	#4	-	-	-	-	2,155	1,575	1,420

1. Design (LRFD) strengths are based on a safety factor ,ϕ, determined in accordance with AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of Fu = 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. Unless otherwise noted, for steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength Fu ≥ 65 ksi steel, multiply tabulated values by 1.44.
6. The fisrt 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.
7. For steel with a minimum tensile strength Fu ≥ 55 ksi, multiply tabulated values by 1.22.
8. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
9. For steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29.

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

Diameter	Point Type	Thickness of Steel Not in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	#2/#3	335	485	585	955	1,135	-	-	-
#10-24	#3	330	505	675	1,125	1,480	-	-	-
#12-14	#2/#3	335	510	655	790	1,380	1,795	-	-
#12-24	#5	-	-	605	1,030	1,370	2,410	2,760	2,760
1/4"-14	#3	340	515	630	825	1,515	2,430	-	-
1/4"-20	#4/#5	-	555	705	1,145	1,410	2,575	2,810	3,255
5/16"-18	#3	-	-	-	1,400	1,915	-	-	-
5/16"-24	#4	-	-	-	1,290	1,725	2,620	3,565	4,270

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	Thickness of Steel Not in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	#2/#3	135	195	235	305	295	-	-	-
#10-24	#3	120 [8]	185 [7]	250 [6]	415 [6]	545 [7]	-	-	-
#12-14	#2/#3	130	205	265	330	510	665	-	-
#12-24	#5	95 [8]	165 [7]	225 [6]	380 [6]	505 [7]	890 [8]	1,020	1,020
1/4"-14	#3	130	205	255	340	560	900	-	-
1/4"-20	#4/#5	-	205 [6]	260 [6]	425 [6]	525 [7]	915 [7]	1,045	1,205
5/16"-18	#3	-	-	-	520	705	-	-	-
5/16"-24	#4	-	-	-	460	635	725	1,190	1,425

1. Allowable (ASD) strengths are based on a safety factor ,Ω, determined in accordance with AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of Fu = 45 ksi.
3. Allowable (ASD) pull-over capacities for other member thicknesses may be determined 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 steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength Fu ≥ 65 ksi steel, multiply tabulated values by 1.44.
6. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
7. For steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29.
8. Increasing values for higher steel tensile strength per Note 5 is not allowed.

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

Diameter	Point Type	Thickness of Steel Not in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	#2/#3	215	310	380	490	475	-	-	-
#10-24	#3	194 [8]	295 [7]	400 [6]	665 [6]	875 [7]	-	-	-
#12-14	#2/#3	210	330	425	525	815	1,065	-	-
#12-24	#5	155 [8]	265 [7]	360 [6]	610 [6]	810 [7]	1425 [8]	1,630	1,630
1/4"-14	#3	210	330	410	550	895	1,440	-	-
1/4"-20	#4/#5	-	325 [6]	415 [6]	675 [6]	840 [7]	1,460 [7]	1,670	1,930
5/16"-18	#3	-	-	-	830	1,130	-	-	-
5/16"-24	#4	-	-	-	735	1,020	1,160	1,905	2,280

1. Design (LRFD) strengths are based on a resistance factor, ϕ, determined in accordance with AISI S100-16.
2. Values are based on steel members with a minimum tensile strength of Fu = 45 ksi.
3. Design (LRFD) pull-out capacities for other member thicknesses may be determined 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 steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29 and for steel with a minimum tensile strength Fu ≥ 65 ksi steel, multiply tabulated values by 1.44.
6. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
7. For steel with a minimum tensile strength Fu ≥ 58 ksi, multiply tabulated values by 1.29.
8. Increasing values for higher steel tensile strength per Note 5 is not allowed.

Ultimate Pull-Over Capacity of Screw Connections in Steel, lbf [1,3]

Fastener Description		Minimum Thickness of Steel in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	Phillips Pan Head	1,155 [2]	1,200	1,200	1,200	1,200	-	-	-
#10-16	5/16" Hex Washer Head	1,245	1,200	1,200	1,200	1,200	-	-	-
#10-24	Phillips Wafer Head	1,650 [2]	1,615 [2]	1,935 [2]	1,935 [2]	1,935 [2]	-	-	-
#12-14	5/16" Hex Washer Head	1,290	1610	2,015	1,835	1,835	1,835	-	-
#12-14	Phillips Undercut Flat Head	1,060 [2]	1,455 [2]	1,845 [2]	2,160 [2]	2,160 [2]	2,160 [2]	-	-
#12-24	5/16" Hex Washer Head	1,290	1,610	2,015	1,835	1,835	1,835	1,835	1,835
1/4"-14	3/8" Hex Washer Head	1,555	1,945	2,430	2,815	2,815	2,815	-	-
1/4"-20	3/8" Hex Washer Head	-	1,945	2,430	2,815	2,815	2,815	2,815	2,815
5/16"-18	3/8" Hex Washer Head	-	-	-	3,045	3,045	-	-	-
5/16"-24	3/8" Hex Washer Head	-	-	-	3,045	3,045	3,045	3,045	3,045

1. Unless otherwise noted, ultimate strengths are based on calculations in accordance with AISI S100-16, or on the calculated shear strength of the integral washer.
2. Ultimate strengths are based on laboratory testing.
3. 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 Steel, lbf [1,2,3,5,6]

Fastener Description		Minimum Thickness of Steel in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	Phillips Pan Head	385	480	480	480	480	-	-	-
#10-16	5/16" Hex Washer Head	415	480	480	480	480	-	-	-
#10-24	Phillips Wafer Head	610	595 [4]	715 [4]	715 [4]	715 [4]	-	-	-
#12-14	5/16" Hex Washer Head	430	535	670	735	735	735	-	-
#12-14	Phillips Undercut Flat Head	390	535 [4]	680 [4]	795 [4]	795 [4]	795 [4]	-	-
#12-24	5/16" Hex Washer Head	430	535	670	735	735	735	735	735
1/4"-14	3/8" Hex Washer Head	520	650	810	1,125	1,125	1,125	-	-
1/4"-20	3/8" Hex Washer Head	-	650	810	1,125	1,125	1,125	1,125	1,125
5/16"-18	3/8" Hex Washer Head	-	-	-	1,170	1,170	-	-	-
5/16"-24	3/8" Hex Washer Head	-	-	-	1,325	1,325	1,325	1,325	1,325

1. Allowable (ASD) strengths are based on a safety factor, Ω, 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. Unless otherwise noted, increasing values for higher steel tensile strength per Note 4 is not allowed.
4. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
5. Allowable (ASD) pull-over capacities for other member thicknesses may be determined by interpolating within the table.
6. 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.

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

Fastener Description		Minimum Thickness of Steel in Contact with Screw Head							
		18 Ga.	16 Ga.	14 Ga.	12 Ga.	1/8"	3/16"	1/4"	5/16"
#10-16	Phillips Pan Head	580	725	780	780	780	-	-	-
#10-16	5/16" Hex Washer Head	620	780	780	780	780	-	-	-
#10-24	Phillips Wafer Head	975	955 [4]	1,140 [4]	1,140 [4]	1,140 [4]	-	-	-
#12-14	5/16" Hex Washer Head	645	805	1,005	1,190	1,190	1,190	-	-
#12-14	Phillips Undercut Flat Head	625	860 [4]	1,090 [4]	1,275 [4]	1,275 [4]	1,275 [4]	-	-
#12-24	5/16" Hex Washer Head	645	805	1,005	1,190	1,190	1,190	1,190	1,190
1/4"-14	3/8" Hex Washer Head	780	970	1,215	1,700	1,830	1,830	-	-
1/4"-20	3/8" Hex Washer Head	-	970	1,215	1,700	1,830	1,830	1,830	1,830
5/16"-18	3/8" Hex Washer Head	-	-	-	1,870	1,870	1,870	-	-
5/16"-24	3/8" Hex Washer Head	-	-	-	2,120	2,120	2,120	2,120	2,120

1. Design (LRFD) strengths are based on a resistance factor, ϕ, 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. Unless otherwise noted, increasing values for higher steel tensile strength per Note 4 is not allowed.
4. For steel with a minimum tensile strength Fu ≥ 52 ksi, multiply tabulated values by 1.15.
5. Design (LRFD) pull-over capacities for other member thicknesses may be determined by interpolating within the table.
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.

Ultimate Shear (Bearing) Capacity of Screw Connections of Aluminum to Steel, lbf [1,2,3,4]

Screw Size	Head Styles	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)			6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)			6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)		
			1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#12 - 14	HWH	3	900	-	-	1,405	-	-	1,490	-	-
#12 - 14	PUFH	3	970	-	-	1,515	-	-	1,605	-	-
#12 - 24	HWH	5	905	2,120	1,775	1,410	2,515	2,105	1,495	2,515	2,105
1/4" - 14	HWH	3	905	-	-	1,415	-	-	1,495	-	-
1/4" - 20	HWH	4	875	2,300	-	1,370	2,730	-	1,450	2,730	-
1/4" - 20	HWH	5	905	2,265	1,835	1,415	2,690	2,180	1,495	2,690	2,180

1. Ultimate strengths are based on laboratory testing.
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. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.
4. Testing included the use of a flexible spacer material between the aluminum and the steel to simulate the use of interstitial materials intended to prevent galvanic corrosion. The thicknesses of these spacers are noted in the Allowable (ASD) and Design (LRFD) stength tables.

Allowable (ASD) Shear (Bearing) Capacity of Screw Connections of Aluminum to Steel, lbf [1,2,3,4,5,6,7]

Screw Size	Head Styles	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)			6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)			6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)		
			1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#12 - 14	HWH	3	300 [7]	-	-	470 [7]	-	-	495 [7]	-	-
#12 - 14	PUFH	3	325 [7]	-	-	505 [7]	-	-	535 [7]	-	-
#12 - 24	HWH	5	300	705	590	470	840	700	500	840	700
1/4" - 14	HWH	3	300 [6]	-	-	470 [6]	-	-	500 [6]	-	-
1/4" - 20	HWH	4	290	765	-	455	910	-	485	910	-
1/4" - 20	HWH	5	300	755	610	470	895	725	500	895	725

1. Allowable (ASD) strengths are based on a safety factor, Ω =3.0, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.
3. Values are based on the following minimum steel strengths: Fu= 58 ksi, Fy = 36 ksi.
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. Testing included the use of a flexible spacer material between the aluminum and the steel to simulate the use of interstitial materials intended to prevent galvanic corrosion. Unless otherwise noted, the spacer thickness used in testing was 0.063 inch.
6. Spacer thickness used in testing was 0.05 inch.
7. Spacer thickness used in testing was 0.008 inch.

Design (LRFD) Shear (Bearing) Capacity of Screw Connections of Aluminum to Steel, lbf[1,2,3,4,5,6,7]

Screw Size	Head Styles	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)			6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)			6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)		
			1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#12 - 14	HWH	3	450 [7]	-	-	700 [7]	-	-	745 [7]	-	-
#12 - 14	PUFH	3	485 [7]	-	-	755 [7]	-	-	805 [7]	-	-
#12 - 24	HWH	5	450	1,060	885	705	1,260	1,055	750	1,260	1,055
1/4" - 14	HWH	3	450 [6]	-	-	705 [6]	-	-	750 [6]	-	-
1/4" - 20	HWH	4	440	1,150	-	685	1,365	-	685	1,365	-
1/4" - 20	HWH	5	450	1,130	915	705	1,345	1,090	705	1,345	1,090

1. Design (LRFD) strengths are based on a safety factor, Ω =3.0, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.
3. Values are based on the following minimum steel strengths: Fu= 58 ksi, Fy = 36 ksi.
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. Testing included the use of a flexible spacer material between the aluminum and the steel to simulate the use of interstitial materials intended to prevent galvanic corrosion. Unless otherwise noted, the spacer thickness used in testing was 0.063 inch.
6. Spacer thickness used in testing was 0.05 inch.
7. Spacer thickness used in testing was 0.008 inch.

Ultimate Shear (Bearing) Capacity of Screw Connections in Aluminum, lbf [1,2,3,4]

Screw Size	Head Styles	Point Type	6063-T5 (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 (Fy = 35 ksi, Fu = 38 ksi)			
			1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#10-16	PPH	#2	395	395	785	-	535	535	1,070	-	680	680	1,355	-
#10-16	HWH	#3	395	395	785	-	535	535	1,070	-	680	680	1,355	-
#10-24	PWH	#3	480	-	-	-	610	-	-	-	610	-	-	-
#12-14	HWH	#2	445	445	890	-	610	610	1,215	-	770	770	1,540	-
#12-14	HWH	#3	445	445	890	-	610	610	1,215	-	770	770	1,540	-
#12-14	PUFH	#3	505	980	-	-	640	1,245	-	-	640	1,245	-	-
#12-24	HWH	#5	445	445	1,300	2,090	610	610	1,735	2,280	770	770	1,910	2,280
1/4"-14	HWH	#3	515	515	1,030	-	700	700	1,405	-	890	890	1,780	-
1/4"-20	HWH	#4	515	515	1,495	-	700	700	1,870	-	890	890	2,170	-
1/4"-20	HWH	#5	515	515	1,500	2,285	700	700	1,710	2,615	890	890	2,060	2,285
5/16"-18	HWH	#3	-	-	1,750	2,470	-	-	2,130	3,010	-	-	2,130	3,010
5/16"-24	HWH	#4	-	-	1,520	2,355	-	-	1,850	2,865	-	-	1,850	2,865

1. Ultimate strengths in shaded cells are based on laboratory testing.
2. Ultimate strengths in unshaded cells are based on calculations in accordance with the Aluminum Design Manual, AA ADM-2020.
3. 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).
4. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.

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

Screw Size	Head Styles	Point Type	6063-T5 (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 (Fy = 35 ksi, Fu = 38 ksi)			
			1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#10-16	PPH	#2	130	130	260	-	180	180	355	-	225	225	450	-
#10-16	HWH	#3	130	130	260	-	180	180	355	-	225	225	450	-
#10-24	PWH	#3	160	-	-	-	205	-	-	-	205	-	-	-
#12-14	HWH	#2	150	150	295	-	205	205	405	-	255	255	515	-
#12-14	HWH	#3	150	150	295	-	205	205	405	-	255	255	515	-
#12-14	PUFH	#3	170	325	-	-	215	415	-	-	215	415	-	-
#12-24	HWH	#5	150	150	435	695	205	205	580	760	255	255	635	760
1/4"-14	HWH	#3	170	170	345	-	235	235	470	-	295	295	595	-
1/4"-20	HWH	#4	170	170	500	-	235	235	665	-	295	295	725	-
1/4"-20	HWH	#5	170	170	500	760	235	235	655	760	295	295	685	760
5/16"-18	HWH	#3	-	-	585 [5]	825 [5]	-	-	710 [5]	1,005 [5]	-	-	710 [5]	1,005 [5]
5/16"-24	HWH	#4	-	-	505 [5]	785 [5]	-	-	615 [5]	955 [5]	-	-	615 [5]	955 [5]

1. Allowable (ASD) strengths are based on a safety factor, Ω =3.0, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.
3. Unless otherwise noted, allowable strengths in shaded cells are applicable to screws which are self-drilled through both pieces of aluminum.
4. Allowable strengths in unshaded cells are applicable to screws which are self-drilled through both pieces of aluminum and to screws which are installed through existing holes in the aluminum in contact with the screw head and self-drilled into the receiving member. Clearance holes have the following dimensions: 0.177 inch for #8 screws; 0.201 inch for #10 screws; 0.228 inch for #12 screws; 0.266 inch for 1/4-inch screws.
5. Allowable Strengths are applicable to screws which are installed through existing holes (D=21/64") in the aluminum in contact with the screw head and self-drilled into the recieving member.
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]

Screw Size	Head Styles	Point Type	6063-T5 (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 (Fy = 35 ksi, Fu = 38 ksi)			
			1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"	1/16" - 1/16"	1/16" - 1/8"	1/8" - 1/8"	1/8" - 1/4"
#10-16	PPH	#2	195	195	390	-	265	265	535	-	340	340	675	-
#10-16	HWH	#3	195	195	390	-	265	265	535	-	340	340	675	-
#10-24	PWH	#3	240	-	-	-	305	-	-	-	305	-	-	-
#12-14	HWH	#2	225	225	445	-	305	305	610	-	385	385	770	-
#12-14	HWH	#3	225	225	445	-	305	305	610	-	385	385	770	-
#12-14	PUFH	#3	250	490	-	-	320	625	-	-	320	625	-	-
#12-24	HWH	#5	225	225	650	1,045	305	305	870	1,140	385	385	955	1,140
1/4"-14	HWH	#3	260	260	515	-	350	350	705	-	445	445	890	-
1/4"-20	HWH	#4	260	260	745	-	350	350	995	-	445	445	1,085	-
1/4"-20	HWH	#5	260	260	750	1,140	350	350	980	1,140	445	445	1,030	1,140
5/16"-18	HWH	#3	-	-	875 [5]	1235 [5]	-	-	1065 [5]	1505 [5]	-	-	1065 [5]	1505 [5]
5/16"-24	HWH	#4	-	-	760 [5]	1175 [5]	-	-	925 [5]	1435 [5]	-	-	925 [5]	1435 [5]

1. Design (LRFD) strengths are based on a safety factor, Ω =3.0, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. The first thickness listed is of the aluminum in contact with the screw head, the second thickness listed is of the aluminum not in contact with the screw head.
3. Unless otherwise noted, design strengths in shaded cells are applicable to screws which are self-drilled through both pieces of aluminum.
4. Design strengths in unshaded cells are applicable to screws which are self-drilled through both pieces of aluminum and to screws which are installed through existing holes in the aluminum in contact with the screw head and self-drilled into the recieving member. Clearance holes have the following dimensions: 0.177 inch for #8 screws; 0.201 inch for #10 screws; 0.228 inch for #12 screws; 0.266 inch for 1/4-inch screws.
5. Design Strengths are applicable to screws which are installed through existing holes (D=21/64") in the aluminum in contact with the screw head and self-drilled into the receiving member.
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 Tension Pull-Out Capacity of Screw Connections in Aluminum, lbf[1,2]

Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)					6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)					6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)				
		1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"
#10-16	#2	235	600	-	-	-	355	895	-	-	-	460	1,175	-	-	-
#10-16	#3	230	540	-	-	-	300	830	-	-	-	395	1,145	-	-	-
#10-24	#3	245	580	-	-	-	300	850	-	-	-	325	1,085	-	-	-
#12 - 14	#2	310	680	-	-	-	340	985	-	-	-	440	1,245	-	-	-
#12 - 14	#3	310	650	1,260	-	-	340	950	1,775	-	-	435	1,210	2,110	-	-
#12 - 24	#5	-	550	1,075	1,230	1,345	-	785	1,460	1,990	1,990	-	965	1,625	2,435	2,435
1/4" - 14	#3	255	725	1,310	-	-	370	1,040	1,930	-	-	430	1,285	2,495	-	-
1/4" - 20	#4	-	700	1,340	1,765	1,925	-	1,010	1,850	2,540	2,930	-	1,250	2,125	3,340	3,585
1/4" - 20	#5	-	670	1,310	1,790	1,800	-	1,000	1,865	2,525	2,645	-	1,300	2,255	3,225	3,400
5/16"-18	#3	-	920	-	2,435	-	-	1,120	-	2,965	-	-	1,120	-	2,965	-
5/16"-24	#4	-	855	-	2,105	-	-	1,045	-	2,565	-	-	1,045	-	2,565	-

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 (ASD) Tension Pull-Out Capacity of Screw Connections in Aluminum, lbf[1,2]

Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)					6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)					6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)				
		1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"
#10-16	#2	80	200	-	-	-	120	300	-	-	-	155	390	-	-	-
#10-16	#3	75	180	-	-	-	100	275	-	-	-	130	380	-	-	-
#10-24	#3	80	195	-	-	-	100	285	-	-	-	110	360	-	-	-
#12 - 14	#2	105	225	-	-	-	115	330	-	-	-	145	415	-	-	-
#12 - 14	#3	105	215	420	-	-	115	315	590	-	-	145	405	705	-	-
#12 - 24	#5	-	185	360	410	450	-	260	485	665	665	-	320	540	810	810
1/4" - 14	#3	85	240	435	-	-	125	345	645	-	-	145	430	830	-	-
1/4" - 20	#4	-	235	445	590	640	-	335	615	845	975	-	415	710	1,115	1,195
1/4" - 20	#5	-	225	435	595	600	-	335	620	840	880	-	435	750	1,075	1,135
5/16"-18	#3	-	305	-	810	-	-	375	-	990	-	-	375	-	990	-
5/16"-24	#4	-	285	-	700	-	-	350	-	855	-	-	350	-	855	-

1. Allowable (ASD) strengths are based on a safety factor, $\Omega = 3.0$.
2. 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.

Design (LRFD) Tension Pull-Out Capacity of Screw Connections in Aluminum, lbf[1,2]

Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)					6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)					6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)				
		1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"	1/16"	1/8"	3/16"	1/4"	5/16"
#10-16	#2	120	300	-	-	-	180	445	-	-	-	230	585	-	-	-
#10-16	#3	115	270	-	-	-	150	415	-	-	-	200	570	-	-	-
#10-24	#3	125	290	-	-	-	150	425	-	-	-	165	540	-	-	-
#12 - 14	#2	155	340	-	-	-	170	495	-	-	-	220	620	-	-	-
#12 - 14	#3	155	325	630	-	-	170	475	885	-	-	220	605	1,055	-	-
#12 - 24	#5	-	275	535	615	675	-	395	730	995	995	-	485	815	1,220	1,220
1/4" - 14	#3	130	360	655	-	-	185	520	965	-	-	215	640	1,250	-	-
1/4" - 20	#4	-	350	670	885	960	-	505	925	1,270	1,465	-	625	1,065	1,670	1,795
1/4" - 20	#5	-	335	655	895	900	-	500	930	1,260	1,325	-	650	1,130	1,615	1,700
5/16"-18	#3	-	460	-	1,220	-	-	560	-	1,485	-	-	560	-	1,485	-
5/16"-24	#4	-	430	-	1,055	-	-	520	-	1,285	-	-	520	-	1,285	-

1. Design (LRFD) strengths are based on a resistance factor, Ω=0.5.
2. 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.

Ultimate Pull-Over Capacity of Screw Connections in Aluminum, lbf[1,2,3]

Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)			
		1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"
#10-16	PPH	115	225	450	680	155	310	615	925	195	390	780	1,170
#10-16	HWH	135	505	1,225	2,155	185	790	1,910	3,365	235	1,105	2,675	4,710
#10-24	PWH	-	830	1,530	-	-	1,295	1,815	-	-	1,375	1,815	-
#12-14	HWH	185	605	1,600	2,455	255	950	2,225	3,835	325	1,325	3,115	5,375
#12-14	HWH	130	520	1,600	2,200	175	815	1,960	3,440	220	1,140	2,745	4,815
#12-14	PUFH	-	745	1,545	1,545	-	1,170	1,835	1,835	-	1,240	1,835	1,835
#12-24	HWH	130	520	1,600	2,200	175	815	1,960	3,440	220	1,140	2,745	4,815
1/4"-14	HWH	160	605	2,215	2,455	220	950	2,630	3,835	280	1,325	3,115	5,375
1/4"-20	HWH	160	605	2,215	2,965	220	950	2,630	3,835	280	1,325	3,115	5,375

1. Ultimate strengths in shaded cells are based on laboratory tests.
2. Ultimate strengths in unshaded cells are based on calculations in accordance with the Aluminum Design Manual, AA ADM-2020.
3. 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]

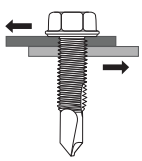
Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)			
		1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"
#10-16	PPH	40	75	150	225	50	105	205	310	65	130	260	390
#10-16	HWH	45	170	410	720	60	265	635	1,120	80	370	890	1,570
#10-24	PWH	-	275	510	-	-	430	605	-	-	460	605	-
#12-14	HWH	60	200	535	820	85	315	740	1,280	110	440	1,040	1,790
#12-14	HWH	45	175	535	735	60	270	655	1,145	75	380	915	1,605
#12-14	PUFH	-	250	515	515	-	390	610	610	-	415	610	610
#12-24	HWH	45	175	535	735	60	270	655	1,145	75	380	915	1,605
1/4"-14	HWH	55	200	740	820	75	315	875	1,280	95	440	1,040	1,790
1/4"-20	HWH	55	200	740	990	75	315	875	1,280	95	440	1,040	1,790

1. Allowable strengths are based on a safety factor, $\Omega = 3.00$, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. Available strengths in shaded cells apply to screws which are self-drilled.
3. Available strengths in unshaded cells are applicable to screws which are self-drilled and to screws which are installed in existing holes in the aluminum which have the following dimensions: 0.177 inch for #8 screws; 0.201 inch for #10 screws; 0.228 inch for #12 screws; 0.266 inch for 1/4-inch screws.
4. Allowable strengths for member thicknesses which are not addressed in the table may be determined by calculation in accordance with the ADM.
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.

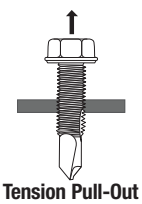
Design (LRFD) Pull-Over Capacity of Screw Connections in Aluminum, lbf[1,2,3,4,5]

Screw Size	Point Type	6063-T5 to 58ksi Steel (Fy = 16 ksi, Fu = 22 ksi)				6063-T6 to 58ksi Steel (Fy = 25 ksi, Fu = 30 ksi)				6061-T6 to 58 ksi Steel (Fy = 35 ksi, Fu = 38 ksi)			
		1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"	1/32"	1/16"	1/8"	3/16"
#10-16	PPH	55	115	225	340	75	155	310	460	95	195	390	585
#10-16	HWH	70	255	610	1,075	95	395	955	1,680	120	555	1,340	2,355
#10-24	PWH	-	415	765	-	-	650	910	-	-	690	910	-
#12-14	HWH	95	305	800	1,230	130	475	1,115	1,920	160	665	1,560	2,685
#12-14	HWH	65	260	800	1,100	90	405	980	1,720	110	570	1,375	2,410
#12-14	PUFH	-	375	775	775	-	585	920	920	-	620	920	920
#12-24	HWH	65	260	800	1,100	90	405	980	1,720	110	570	1,375	2,410
1/4"-14	HWH	80	305	1,105	1,230	110	475	1,315	1,920	140	665	1,560	2,685
1/4"-20	HWH	80	305	1,105	1,480	110	475	1,315	1,920	140	665	1,560	2,685

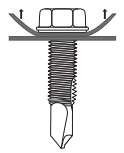
1. Design (LRFD) strengths are based on a resistance factor, $\phi = 0.50$, determined in accordance with the Aluminum Design Manual, AA ADM-2020.
2. Design strengths in shaded cells apply to screws which are self-drilled.
3. Design strengths in unshaded cells are applicable to screws which are self-drilled and to screws which are installed in existing holes in the aluminum which have the following dimensions: 0.177 inch for #8 screws; 0.201 inch for #10 screws; 0.228 inch for #12 screws; 0.266 inch for 1/4-inch screws.
4. Design strengths for member thicknesses which are not addressed in the table may be determined by calculation in accordance with the ADM.
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.



Shearing (Bearing)



Tension Pull-Out



Pull-Over

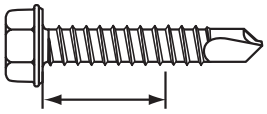
ORDERING INFORMATION

Dril-Flex

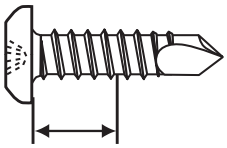
Cat. No.	Description (Diameter- TPI x Nominal Length)	Point Type	Finish	Maximum Load-Bearing Length[1] (in.)	Minimum Protrusion Length[2]	Nominal Head Diameter[3] (in.)	Nominal Head Height[4] (in.)	Qty / Carton
#10 Diameter, 5/16" Hex Washer Head								
EAF430	#10 - 16 x 3/4"	#3	Stalgard SUB	0.250	1/2"	0.400	0.14	6,000
EAF460	#10 - 16 x 1-1/2"	#3	Stalgard SUB	1.000	1/2"	0.400	0.14	2,500
EAF470	#10 - 16 x 2"	#3	Stalgard SUB	1.500	1/2"	0.415	0.17	2,000
EAF480	#10 - 16 x 2-1/2"	#3	Stalgard SUB	2.000	1/2"	0.400	0.14	1,500
#10 Diameter, #2 Phillips Pan Head								
EDX445	#10 - 16 x 3/4"	#2	Stalgard	0.344	13/32"	0.365	0.13	6,000
#10 Diameter, #2 Phillips Wafer Head								
EBL530	#10 - 24 x 1-1/4"	#3	Stalgard	0.781	15/32"	0.470	0.05	5,000
#12 Diameter, 5/16" Hex Washer Head								
EAF621	#12 - 14 x 7/8"	#3	Stalgard SUB	0.375	1/2"	0.415	0.18	5,000
EAF641	#12 - 14 x 1"	#3	Stalgard SUB	0.500	1/2"	0.415	0.18	4,000
EAF661	#12 - 14 x 1-1/4"	#3	Stalgard SUB	0.750	1/2"	0.415	0.18	2,500
EAF681	#12 - 14 x 1-1/2"	#3	Stalgard SUB	1.000	1/2"	0.415	0.18	2,500
EAF755	#12 - 24 x 1-3/4"	#5	Stalgard SUB	0.813	15/16"	0.415	0.18	2,500
EAF690	#12 - 14 x 2"	#3	Stalgard SUB	1.500	1/2"	0.415	0.18	2,000
EAF715	#12 - 14 x 3"	#2	Stalgard SUB	2.375	5/8"	0.500	0.19	1,000
#12 Diameter, #3 Phillips Undercut Flat Head								
EBL215 [6]	#12 - 14 x 1"	#3	Stalgard	0.500	1/2"	0.415	0.09	4,000
EBL220 [6]	#12 - 14 x 1-1/4"	#3	Stalgard	0.750	1/2"	0.415	0.09	3,000
EBL223 [6]	#12 - 14 x 1-1/2"	#3	Stalgard	1.000	1/2"	0.415	0.09	2,500
1/4" Diameter, 3/8" Hex Washer Head								
EAF816	1/4" - 14 x 1"	#3	Stalgard SUB	0.438	9/16"	0.500	0.23	3,000
EAF865	1/4" - 20 x 1-1/8"	#4	Stalgard SUB	0.438	11/16"	0.500	0.23	2,500
EAF841	1/4" - 14 x 1-1/2"	#3	Stalgard SUB	0.938	9/16"	0.500	0.23	2,000
EAF876	1/4" - 20 x 1-1/2"	#4	Stalgard SUB	0.813	11/16"	0.500	0.23	2,000
EAF888	1/4" - 20 x 1-3/4"	#5	Stalgard SUB	0.813	15/16"	0.500	0.23	1,000
EAF846	1/4" - 14 x 2"	#3	Stalgard SUB	1.438	9/16"	0.500	0.23	1,500
EAF886	1/4" - 20 x 2"	#4	Stalgard SUB	1.313	11/16"	0.500	0.23	1,500
EAF890	1/4" - 20 x 2-1/2"	#4	Stalgard SUB	1.813	11/16"	0.500	0.23	1,000
EAF900 [5]	1/4" - 20 x 3-3/8"	#4	Stalgard SUB	2.625	3/4"	0.500	0.23	500
EAF910 [5]	1/4" - 20 x 4"	#4	Stalgard SUB	3.250	3/4"	0.500	0.23	500
1/4" Diameter, #3 Phillips Undercut Flat Head								
EBL330 [5,6]	1/4" - 20 x 3"	#4	Stalgard	2.250	3/4"	0.460	0.10	500
EBL340 [5,6]	1/4" - 20 x 4"	#4	Stalgard	3.250	3/4"	0.460	0.10	500
5/16" Diameter, 3/8" Hex Washer Head								
EAF940	5/16" - 18 x 1-1/2"	#3	Stalgard SUB	0.813	11/16"	0.600	0.27	1,000
EAF960	5/16" - 24 x 1-1/2"	#4	Stalgard SUB	0.750	3/4"	0.600	0.27	1,000
EAF970	5/16" - 24 x 2"	#4	Stalgard SUB	1.250	3/4"	0.600	0.27	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 higher hardness 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. Partially Threaded Fastener with a thread length of 2.00".
6. Undercut Flat Head screws have an 82 degree head angle.

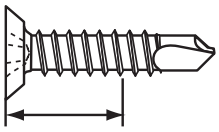
Load Bearing Area



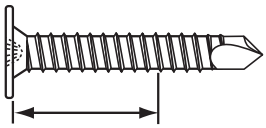
Hex Washer Head



Pan Head



Undercut Flat Head



Wafer head

Screwguns

Cat. No.	Description	Screw Diameter
DW268	2,500 RPM VSR VERSA-CLUTCH™ Screwgun	#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	#10-1/4"

For 20V MAX Maximum initial battery voltage measured without a workload is 20 volts. Nominal voltage is 18.
Dril-Flex 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 1.
Impact tools are not recommended for the installation of Dril-Flex fasteners.

Accessories

Cat. No.	Description
DWA3HLDFT	3IN IMPACT READY® HOLDER
DWA1PH2IR3	1IN PHILLIPS #2 IMPACT READY® BIT TIP (3 PACK)
DWA1PH3IR3	1IN PHILLIPS #3 IMPACT READY® BIT TIP (3 PACK)
DW2221IR	1/4" x 2-9/16" IMPACT READY® MAGNECTIC NUT DRIVER
DW2222IR	5/16" x 2-9/16" IMPACT READY® MAGNECTIC NUT DRIVER
DW2223IR	3/8" x 2-9/16" IMPACT READY® MAGNECTIC NUT DRIVER
DWANGFT32SET	32 PIECE NEXT GEN IR FLEX TORQ SET
DWANGFT26SET	26 PIECE NEXT GEN IR FLEX TORQ SET