

# Dril-Flex® Structural Drill Screws

Virtually immune to delayed embrittlement failures



Dual heat treated drill screws provide the strength, ductility and resistance to embrittlement required for critical applications.

### Specifications

- Diameters: #10 to 5/16"
- Lengths: 3/4" to 4"
- Head/Drive Styles: Hex washer and phillips pan, wafer and undercut flat
- Point Types: #3, #4 and #5
- Material: Alloy steel
- Heat Treat: Grade 5
- Finish: Silver Stalgard® or Stalgard SUB coating

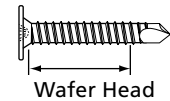
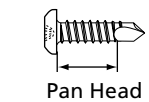
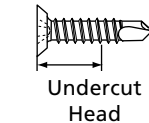
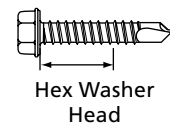
### Features & Benefits

- Stalgard SUB coating (Hex washer product only) provides 2000 hours of salt spray resistance (per ASTM B117)
- High-hardness points and lead threads for drilling and tapping with lower-hardness in load-bearing threads for ductility
- Virtually immune to delayed embrittlement failures

Catalog No.	Description	Pt.	Load-Bearing Area	Finish	Carton Quantity	Carton Weight
<b>#10 Diameter, 5/16" Hex Washer Head</b>						
EAF430	10-16 x 3/4"	#3	.380"	Stalgard SUB	6,000	48
EAF460	10-16 x 1-1/2"	#3	1.25"	Stalgard SUB	2,500	30
EAF470	10-16 x 2"	#3	1.50"	Stalgard SUB	2,000	28
EAF480	10-16 x 2-1/2"	#3	2.25"	Stalgard SUB	1,500	25
<b>#10 Diameter, #2 Phillips Pan Head</b>						
EDX445	10-16 x 3/4"	#2	.380"	Stalgard	6,000	36
<b>#10 Diameter, #2 Phillips Wafer Head</b>						
EBL530	10-24 x 1-1/4"	#3	.750"	Stalgard	5,000	44
<b>#12 Diameter, 5/16" Hex Washer Head</b>						
EAF621*	12-14 x 7/8"	#3	.380"	Stalgard SUB	5,000	54
EAF641	12-14 x 1"	#3	.500"	Stalgard SUB	4,000	44
EAF681	12-14 x 1-1/2"	#3	1.00"	Stalgard SUB	2,500	38
EAF690	12-14 x 2"	#3	1.50"	Stalgard SUB	2,000	37
EAF715	12-14 x 3"	#2	2.35"	Stalgard SUB	1,000	27
<b>#12 Diameter, #3 Phillips Undercut Flat Head</b>						
EBL215	12-14 x 1"	#3	.500"	Stalgard	4,000	36
EBL223	12-14 x 1-1/2"	#3	1.00"	Stalgard	2,500	26
<b>1/4" Diameter, 3/8" Hex Washer Head</b>						
EAF816	1/4-14 x 1"	#3	.450"	Stalgard SUB	3,000	54
EAF841	1/4-14 x 1-1/2"	#3	.950"	Stalgard SUB	2,000	45
EAF876	1/4-20 x 1-1/2"	#4	.830"	Stalgard SUB	2,000	48
EAF846	1/4-14 x 2"	#3	1.45"	Stalgard SUB	1,500	41
EAF886	1/4-20 x 2"	#4	1.33"	Stalgard SUB	1,500	45
EAF865	1/4-20 x 1-1/8"	#4	.500"	Stalgard SUB	2,500	51
EAF888	1/4-20 x 1-3/4"	#5	.800"	Stalgard SUB	1,000	27
EAF890	1/4-20 x 2-1/2"	#4	1.83"	Stalgard SUB	1,000	45
EAF900	1/4-20 x 3-3/8"	#4	2.70"	Stalgard SUB	500	22
EAF910	1/4-20 x 4"	#4	3.50"	Stalgard SUB	500	23
<b>1/4" Diameter, #3 Phillips Undercut Flat Head</b>						
EBL330	1/4-20 x 3"	#4	2.50"	Stalgard	500	20
EBL340	1/4-20 x 4"	#4	3.50"	Stalgard	500	23
<b>5/16" Diameter, 3/8" Hex Washer Head</b>						
EAF940	5/16-18 x 1-1/2"	#3	.800"	Stalgard SUB	1,000	37
EAF960	5/16-24 x 1-1/2"	#4	.800"	Stalgard SUB	1,000	40
EAF970	5/16-24 x 2"	#4	1.25"	Stalgard SUB	1,000	49
<b>3/8" Diameter, 3/8" Hex Washer Head</b>						
EAF310	3/8-16 x 1-3/4"	#1	.850"	Stalgard SUB	500	18

\* for aluminum applications only.

### Load-Bearing Area:



# Dril-Flex® Structural Drill Screws

Technical Information

**Pull-out Tests – Steel:** Pull-out values shown are in lbs.

Screw Size	Point Type	Drill Cap.	Steel								
			18	16	14	12	1/8	3/16	1/4	5/16	
10-16	3	.150	396	501	634	1595	1693				
12-14	3	.187	396	527	710	1678	2061	2898			
1/4-14	3	.187	398	530	686	1950	2264	3919			
1/4-20	4	.312		516	649	1912	2296	2928	3561	4488	
5/16-18	3	.210				2333	2856				
5/16-24	4	.312				2148	2573	4226	5424	6622	
3/8-16	1	.075			1843						

**Shear Tests – Steel:** Shear values shown are in lbs.

Screw Size	Point Type	Drill Cap.	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	.150	1362	1733	1462					
12-14	3	.187	1315	2118	1655	1816				
1/4-14	3	.210	1395	2313	1681	2417	2600			
1/4-20	4	.312	1350	2086	1582	2450	2814	2810	2706	
5/16-18	3	.210	1509	2300	1811	3255				
5/16-24	4	.312					5486	5283	4761	
3/8-16	1	.075				6750				

**NOTE:** All test setups and dimensions were as limited and outlined in AISI Test Method for Mechanically Fastened Cold-Formed Steel Connections (CF92-1) document. Performance values listed are ultimate values obtained under laboratory conditions.

### Comparison to Stainless Steel Screws

300 series stainless steel fasteners provide high resistance to hydrogen embrittlement failures. However, stainless steel is galvanically incompatible with aluminum or steel panels. In this case, stainless steel fasteners trigger a sacrificial action, which can lead to degradation of the panel and loosening of the fastener.

A dual-hardening process allows Dril-Flex® fasteners to provide high strength and resistance to hydrogen embrittlement failures. Their Stalgard® finish provides corrosion resistance several times greater than other commonly-used finishes. If an environment is corrosive enough to significantly affect the Stalgard finish, the potential for significant degradation of the aluminum/stainless steel assembly would also exist.

### Approvals

- ICC-ES Report No. ESR-3332
- COLA (City of Los Angeles) Research Report #25095

### Identification

(hex washer head shown)



**NOTE:** All performance data shown is based on tests performed under laboratory conditions at independent construction testing facilities. The appropriate safety factor should be applied and code requirements factored into specification and use of these fasteners. A safety factor of 4:1 or 25% of the ultimate average values shown is generally accepted as an appropriate working load. Final determination of the appropriate safety factor and use of these fasteners is the sole responsibility of the user, specifying Engineer, Architect or other responsible person designing the connection. Due to a wide variety of application conditions or intervening factors not under our control, we assume no liability for the use of the information provided in this document.

### Pull-out Tests – Aluminum

Screw Size	Point Type	Drill Cap.	Aluminum 6063-T5		
			1/8"	1/4"	3/8"
10-16	3	.150			
12-14	3	.187	939	2286	
1/4-14	3	.187	1003	2424	
1/4-20	4	.312	897	2075	3683
5/16-18	3	.210	1120	2967	4796
5/16-24	4	.312	1043	2566	

### Shear Tests – Aluminum

Screw Size	Point Type	Drill Cap.	Aluminum 6063-T5	
			1/8" - 1/8"	1/8" - 1/4"
10-16	3	.150	1466	
12-14	3	.187	1797	2483
1/4-14	3	.210	1996	2883
1/4-20	4	.312	2006	2926
5/16-18	3	.210	2132	3009
5/16-24	4	.312	1849	2926

### Embrittlement Tests

Embrittlement testing of Dril-Flex screws was performed in accordance to ASTM F1624-06. Fastener lots were tested to determine their Threshold Stress Limits for both Internal Hydrogen Embrittlement and Environmental Hydrogen Embrittlement. Threshold Stress Limit is the stress level below which no time-dependent cracking will occur. Above this level, subcritical cracking that leads to time-delayed fracture or embrittlement may occur if the fastener is exposed to a hydrogen environment.

### Embrittlement Test Results

- Dril-Flex fasteners have a hardness range of HRC 28 – 34, which is roughly equivalent to a SAE Grade 5 fastener (HRC 25 – 34).
- Dril-Flex fasteners showed resistance to the effect of hydrogen-assisted cracking when loaded to 75% of their tensile strength. This is within accepted industry guidelines for in-service loading conditions.
- Dril-Flex fasteners showed no degradation or failures in tensile strength below their ultimate tensile strength.

