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					

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	.210	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 – 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			

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

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.

Galvanic Series

Anodic End	
Metal/Alloy	*EMF(v)*
Magnesium	-1.60
Zinc	-1.10
Alum (5000, 6000, 7000)	-.75
Iron, Low Alloy Steels	-.70
Alum (2000)	-.60
Lead	-.55
18% Chromium Steel	-.35
Naval Brass	-.30
Brass, Bronze	-.25
Austenitic Stainless (300 Series)	-.20
Nickel	-.15
Silver	0
Gold	+15
Cathodic End	

Approvals

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

Identification

(hex washer head shown)

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.

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.

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