



FC43[®] Panel Fastener Catalog



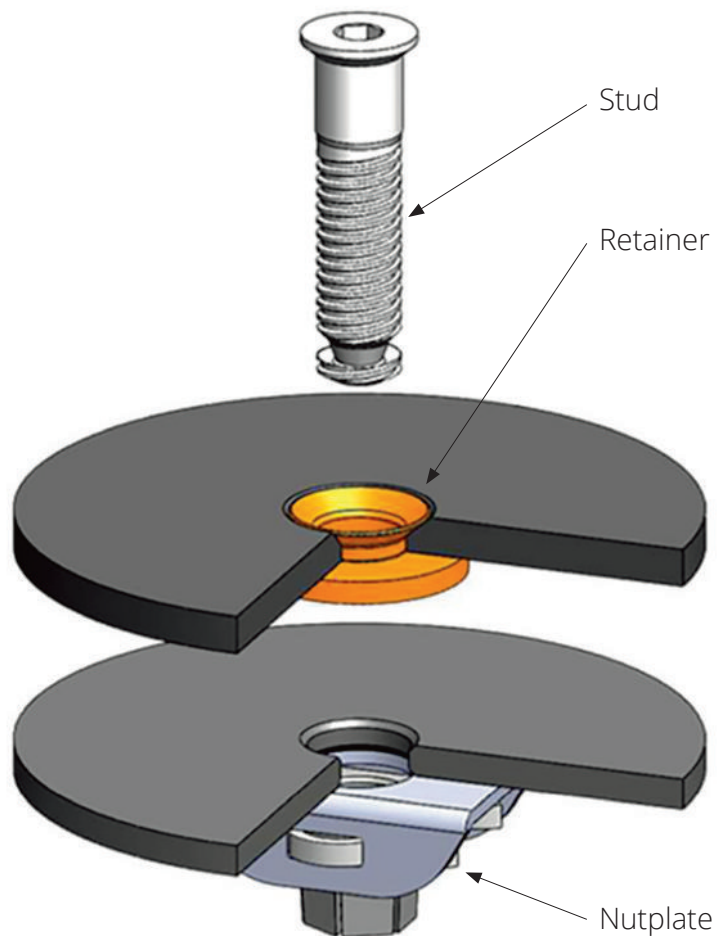
Product Overview

Summary

Howmet Fastening Systems presents the FC43® panel fastener with a novel retaining feature that enables the use of a full cross-sectional area shank bolt. The retaining feature can be used with a variety of thread configurations and is independent of nut style or head configuration, providing an unprecedented modularity for this type of fastening system. With a bolt design that is free of slots or axial recesses, the FC43® fastener provides higher mechanical performance for a given diameter than existing equivalent panel fasteners.

Benefits

- Increased tensile and shear strengths due to the full shank, full cross-section stud bolt design, resulting in an opportunity for overall weight reduction.
- Positive hold-out in all positions, which is helpful when removing or reinstalling a panel.
- Stud bolt available in sizes 08 to 1/4", with single or multiple lead thread, and with various head recesses including hex and six-lobe recesses.
- Choice of metallic or composite nutplate cage, which can be conventionally-riveted or bonded. For high reusability requirements, a FlatBeam™ locknut is recommended.
- Reduced risk of Foreign Object Debris (FOD). Since the retaining ring is captivated within the retainer assembly, it greatly reduces the chance of breaking loose and interfering with aircraft systems.
- Ease and simplicity of installation. The retainer can be flared using either a power or a hand tool. The stud bolt is then pressed through the flared retainer to complete the assembly.



FC43® Panel fastener general configuration

Precision. Strength. Innovation.

The FC43[®] Panel Fastener



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Design Features

Stud

The stud is the component of the panel fastener system that is retained to the panel. Studs are available in a variety of headstyles, with either a hex or NAS1800 six-lobe recess. Studs are available with single lead threads, for highest clamping force and greatest vibration resistance or double lead threads for quickest installation and removal. The studs are made from high strength, A286 corrosion resistant steel. Unlike most other structural panel fasteners, the FC43® stud has a solid cross section, providing the highest shear and tensile strength capability for its size, allowing its use in highly loaded applications or enabling weight savings by either having a larger spacing or smaller diameter than what would be needed for other panel fastening systems.



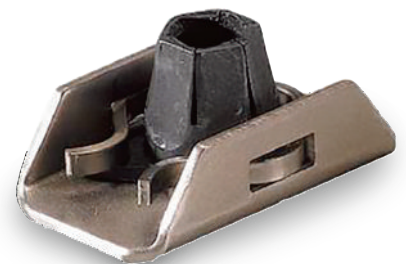
Retainer

This component of the system retains or captivates the stud to the panel. It is usually composed of a retaining ring that can be floating or held by a grommet or housing. The unique radial design of the retaining ring allows the stud to be retracted and inserted freely, but captivates the stud by engaging the retention groove at the end of the stud. The housing protects the retaining ring from the damage to which other retaining ring designs are susceptible.



Nutplate

Since the FC43® stud has threads conforming to AS8879, many widely available nutplates may be used with the FC43® stud and retainer. However, for high reusability requirements, a FlatBeam™ locknut is recommended. This component can be conventionally riveted or bonded.



Component Combinations

The standard AS8879 thread form makes the FC43[®] stud suitable for use with a wide range of aerospace nutplates. The FlatBeam™ locknut is the best choice due to its high reuse capability. Some of the recommended combinations of studs, retainers and nuts are shown in the table below.

Recommended Combinations

SIZE	LEAD	HEADSTYLE	STUD	RETAINER	NUT
08	SINGLE	100° Tension	CA21406-08-()	CA358049-08-() Bonded	FBL10001-08
		100° Shear	CA21410-08-()	CA358045-08-() Flared CA358049-08-() Bonded	
3	SINGLE	100° Tension	CA21406-3-()	CA358049-3-() Bonded	FBL10001-3 FBL10002-3
		100° Shear	CA21410-3-() CA21411-3-()	CA358045-3-() Flared CA358049-3-() Bonded	
	DOUBLE	100° Shear	CA21403-3-()	CA358045-3-() Flared CA358049-3-() Bonded	CA354074-3 CA354077-3
		Pan	CA21409-3-()	CA358049-3-() Bonded	
4	SINGLE	100° Tension	CA21406-4-()	CA358049-4-() Bonded	FBL10001-4 FBL10002-4 FBL10021-4
		130° Tension	CA21413-4-()		
		100° Shear	CA21410-4-()	CA358045-4-() Flared CA358049-4-() Bonded	
	DOUBLE	100° Shear	CA21415-4-()	CA358045-4-() Flared CA358049-4-() Bonded	CA354001-4
		Pan	CA21416-4-()	CA358049-4-() Bonded	
		Socket	CA21417-4-()		

Studs

Configuration

The only requirement that the FC43® fastening system places on the stud is the presence of an annular groove on its tip. Stud material, head style, head dimensions, wrenching recess, thread configuration, thread engagement and grip lengths can be independently defined for different applications. Since no slots or holes are required for the stud, an externally threaded configuration can be optimized to provide the best mechanical properties for a given hole size.

For stud material selection, the standard choice is A286 CRES due to its high strength, superior corrosion resistance and high temperature capability. For other material options, contact Howmet Fastening Systems Engineering.

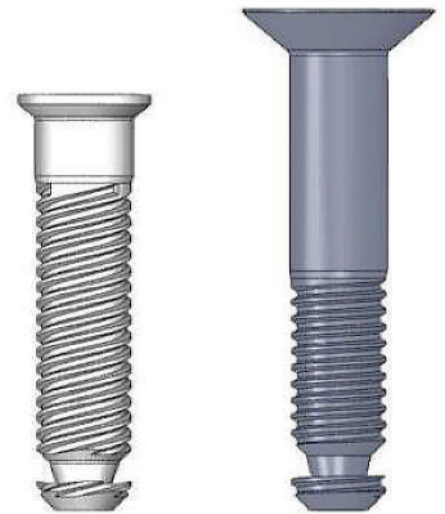
Panel fasteners are often located on the aircraft exterior and tend to be configured with countersink heads. Usually, head sizes are adjusted based on loading and bearing conditions and also on panel thickness. The FC43® fastening system can use studs with virtually any head style and size: from large tension heads for load critical applications to 130° countersink heads for thin, soft composite panels. Studs with pan heads or socket heads, for internal panels and other special applications, are also available.

As for thread configuration, this is one of the features where the FC43® panel fastener benefits the most from its modularity. Panel fasteners are often configured with multi-lead threads, for speed of operation. Double lead threads is the most common option, but the FC43® fastener stud is available with single lead threads as well. Also, thread length and thread engagement can be fully adjusted to suit specific needs, without interfering with the retaining system in any way.

Recess Style

With the stud head configuration comes the choice of recess style. In this regard, the FC43® panel fastener is also completely independent of recess choice. The most common options are hex and NAS1800 six-lobe recess, but other options, such as a Spline-Lok® recess, are also feasible.

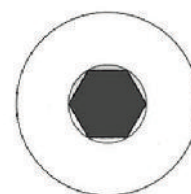
Single and Multiple Thread Options



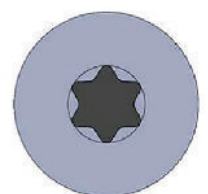
Shear head
Double-lead
thread

Tension head
Single-lead
thread

Head Recesses



Hex recess



Six-lobe recess

Stud Selection

Using the table below, select the stud most appropriate for the application. If the application requires a configuration not shown on the table, contact Howmet Fastening Systems Engineering for availability or other options.

Stud Selection Table 1

HEADSTYLE		THREAD LEAD	RECESS	SIZE	CA21403-3-00	CA21406-0-00	CA21409-3-00	CA21410-0-0H5	CA21411-3-0TX	CA21413-4-0TX	CA21415-4-0TX	CA21416-4-0H5	CA21417-4-0H5		
100° FLUSH	SHEAR	SINGLE	HEX	-08					E						
				-3					E						
				-4						E					
		SIX-LOBE	-08						E	E					
			-3						E						
			-4						E	E					
	DOUBLE	HEX	-08	E								E			
			-3									E			
			-4	E								E			
		SIX-LOBE	-08	E									E		
			-3										E		
			-4	E											
	TENSION	SINGLE	HEX	-08											
				-3											
				-4											
SIX-LOBE		-08													
		-3													
		-4													
130° FLUSH	SHEAR	SINGLE	HEX	-08						E					
				-3						E					
				-4						E					
			SIX-LOBE	-08								E			
				-3								E			
PAN	DOUBLE	HEX	-08			E						E			
			-3									E			
			-4			E									
		SIX-LOBE	-08			E							E		
			-3										E		
SOCKET	DOUBLE	HEX	-08										E		
			-3										E		
			-4												
		SIX-LOBE	-08											E	
			-3											E	
												E			

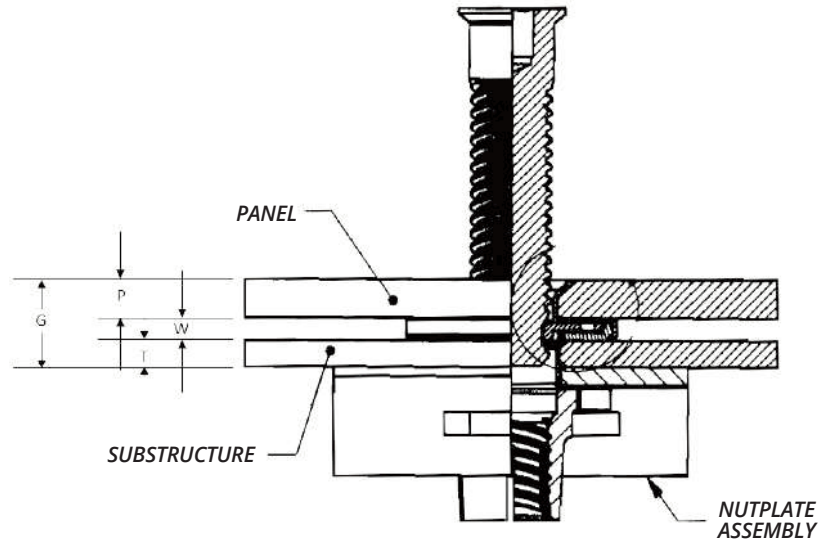
 Available

 Contact Engineering

Stud Grip Code Selection

Determine Grip Thickness

The Grip thickness “G” is the thickness of the panel (P) plus the thickness of substructure (T) plus the gap (W), if any, between the panel and the substructure. In most applications, W is the thickness of the grommet assembly or retaining ring assembly, unless the gasket is thicker or the backside of the panel is counterbored to make the grommet assembly or retaining ring flush with the backside of the panel.



Stud Grip Code Tables

Stud Grip Code Table 2

CA21411-3-()TX			
Dash Code	G, in.		Length, in. (REF)
	Min Grip, in.	Max Grip, in.	
1	0.063	0.125	0.640
2	0.126	0.187	0.702
3	0.188	0.250	0.765
4	0.251	0.312	0.827
5	0.313	0.375	0.890
6	0.376	0.437	0.952
7	0.438	0.500	1.015

Stud Grip Code Table 3

CA21403-3-()() CA21409-3-()() CA21413-4-()TX			
Dash Code	G, in.		Length, in. (REF)
	Min Grip, in.	Max Grip, in.	
2	0.168	0.230	0.801
3	0.231	0.293	0.864
4	0.294	0.355	0.925
5	0.356	0.418	0.989
6	0.419	0.480	1.051
7	0.481	0.543	1.114
8	0.544	0.605	1.176

Stud Grip Code Tables (cont.)

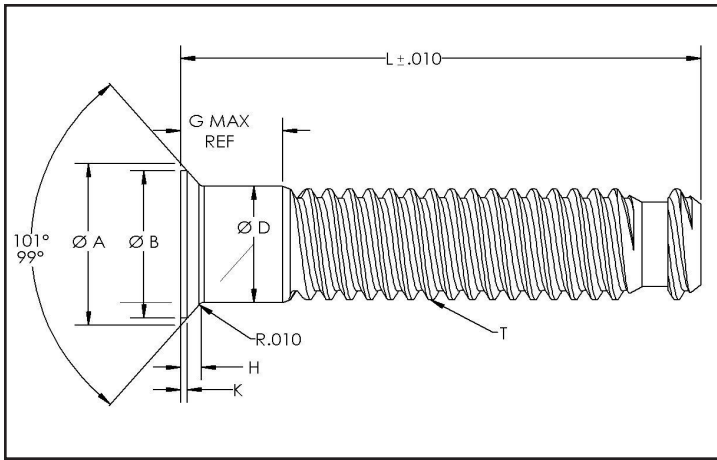
Stud Grip Code Table 4

CA21406-()-() CA21410-()-()HS					
G, in.		Length, in. (REF)			
Dash Code	Min Grip, in.	Max Grip, in.	-08	-3	-4
2	0.063	0.125	0.486	0.583	0.642
3	0.126	0.188	0.549	0.646	0.705
4	0.188	0.250	0.611	0.708	0.767
5	0.251	0.313	0.674	0.771	0.830
6	0.314	0.375	0.736	0.833	0.892
7	0.376	0.438	0.799	0.896	0.955
8	0.439	0.500	0.861	0.958	1.017
9	0.501	0.563	0.924	1.021	1.080
10	0.564	0.625	0.986	1.083	1.142
11	0.626	0.688	1.049	1.146	1.205
12	0.689	0.750	1.111	1.208	1.267
13	0.751	0.813	1.174	1.271	1.330
14	0.814	0.875	1.236	1.333	1.392
15	0.876	0.938	1.299	1.396	1.455
16	0.939	1.000	1.361	1.458	1.517
17	1.001	1.063	1.424	1.521	1.580
18	1.064	1.125	1.486	1.583	1.642
19	1.126	1.188	1.549	1.646	1.705
20	1.189	1.250	1.611	1.708	1.767
21	1.251	1.313	1.674	1.771	1.830
22	1.314	1.375	1.736	1.833	1.892
23	1.376	1.438	1.799	1.896	1.955
24	1.439	1.500	1.861	1.958	2.017
25	1.501	1.563	1.924	2.021	2.080
26	1.564	1.625	1.986	2.083	2.143
27	1.626	1.688	2.049	2.146	2.205
28	1.689	1.750	2.111	2.208	2.267
29	1.751	1.813	2.174	2.271	2.330
30	1.814	1.875	2.236	2.333	2.392
31	1.876	1.938	2.299	2.396	2.455

Stud Grip Code Table 5

CA21415-4-()TX CA21416-4-()HS CA21417-4-()HS			
G, in.			Length, in. (REF)
Dash Code	Min Grip, in.	Max Grip, in.	
2	0.151	0.290	0.960
3	0.221	0.360	1.030
4	0.291	0.430	1.100
5	0.361	0.500	1.170
6	0.431	0.570	1.240
7	0.501	0.640	1.310
8	0.571	0.710	1.380
9	0.641	0.780	1.450
10	0.711	0.850	1.520
11	0.781	0.920	1.590
12	0.851	0.990	1.660
13	0.921	1.060	1.730
14	0.991	1.130	1.800

Studs - 100° Flush Shear Head

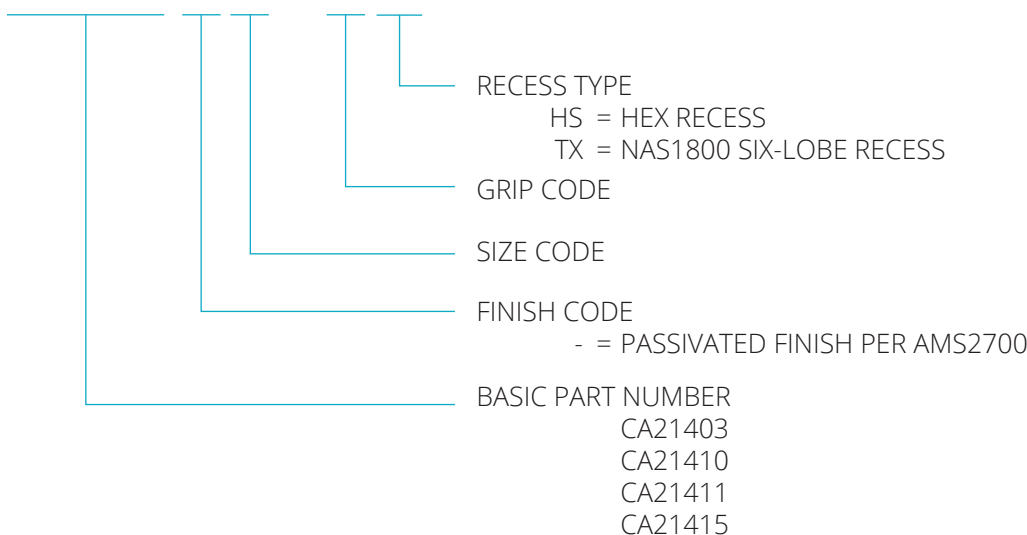


Material: A286 CRES per AMS5731 or AMS5734
Heat Treat: Per AMS2759 and AMS5737 to meet mechanical properties
Finish: Passivated
Recess: Six-lobe recess or hex recess per ANSI B18.3

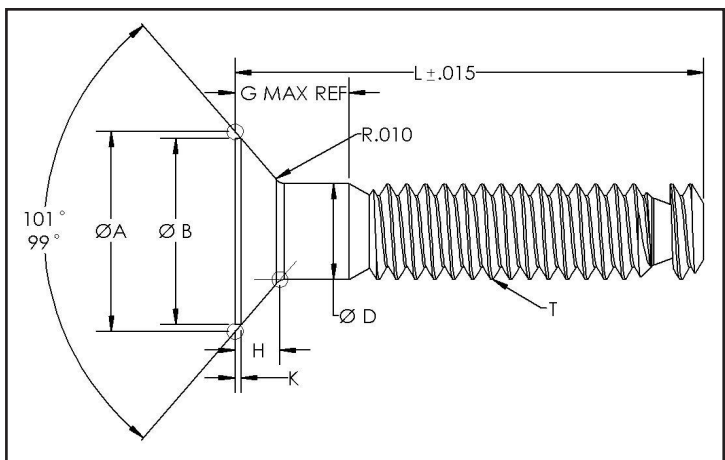
Studs - 100° Flush Shear Head

THREAD LEAD	SIZE	PART NUMBER	T	A MAX	B MIN	D	H REF	K REF	RECESS	G	L
SINGLE	08	CA21410-08-()HS	.1640-32 UNJC-3A	.261	.242	.1635 .1630	.041	.010	3/32	SEE TABLE 4	
	3	CA21410-3-()HS	.1900-32 UNJF-3A	.302	.270	.1895 .1880	.048	.015	1/8		
		CA21411(0)3-()TX		.3047	.2578				T15	SEE TABLE 2	
	4	CA21410-4-()HS	.2500-28 UNJF-3A	.395	.363	.2495 .2490	.061	.015	5/32	SEE TABLE 4	
DOUBLE	3	CA21403-3-()()	.1900-32 UNJF-3A, 2 LEAD	.3047	.2578	.1895 .1880	.049	.015	T15 3/32	SEE TABLE 3	
	4	CA21415(0)4-()TX	.2500-28 UNJF-3A, 2 LEAD	.395	.363	.2495 .2490	.061	.015	T20	SEE TABLE 5	

CA21403 - 3 - 2 TX



Studs - 100° Flush Tension Head



Material: A286 CRES per AMS5731 or AMS5734

Heat Treat: Per AMS2759 to meet mechanical properties

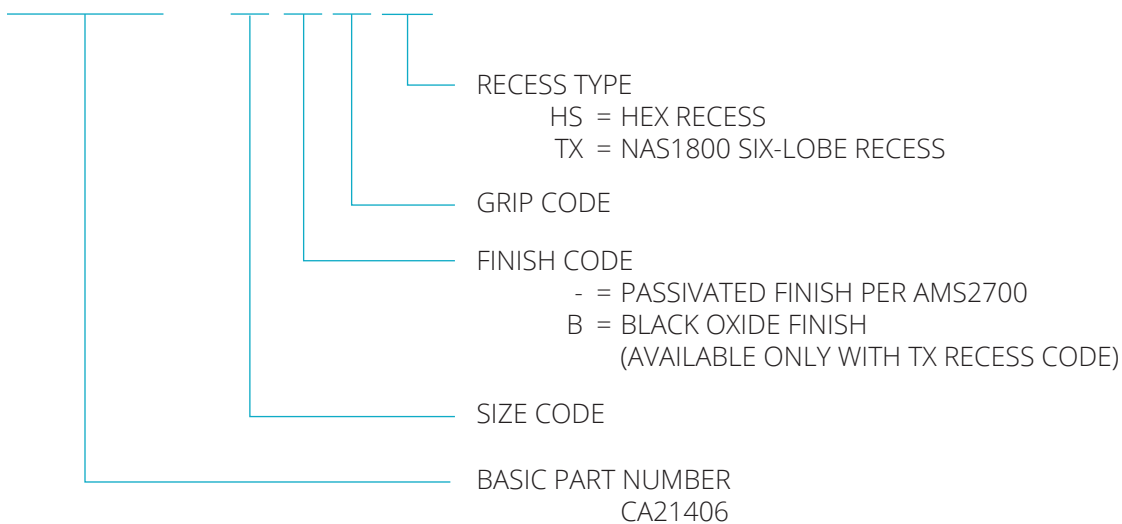
Finish: Passivated per AMS2700

Recess: Six-lobe recess or hex recess per ANSI B18.3

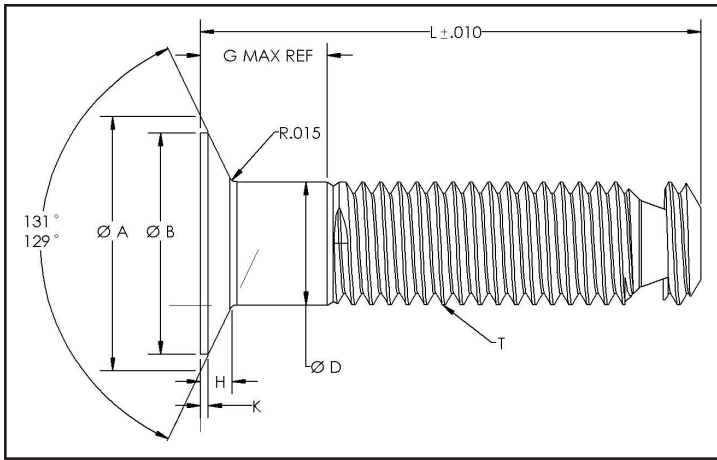
Studs - 100° Flush Tension Head

THREAD LEAD	SIZE	PART NUMBER	T	A MAX	B MIN	D	H REF	K REF	RECESS	G	L
SINGLE	08	CA21406-08-()HS	.1640-32 UNJC-3A	.332	.311	.1635 .1630	.071	.010	3/32		
		CA21406-08-()TX							T20		
	3	CA21406-3-()HS	.1900-32 UNJF-3A	.384	.349	.1895 .1890	.082	.015	1/8		
		CA21406()-3-()TX							T20		
	4	CA21406-4-()HS	.2500-28 UNJF-3A	.507	.471	.2495 .2490	.108	.015	5/32		
		CA21406-4-()TX							T30		

CA21406 - 3 - 2 HS



Studs - 130° Flush Shear Head

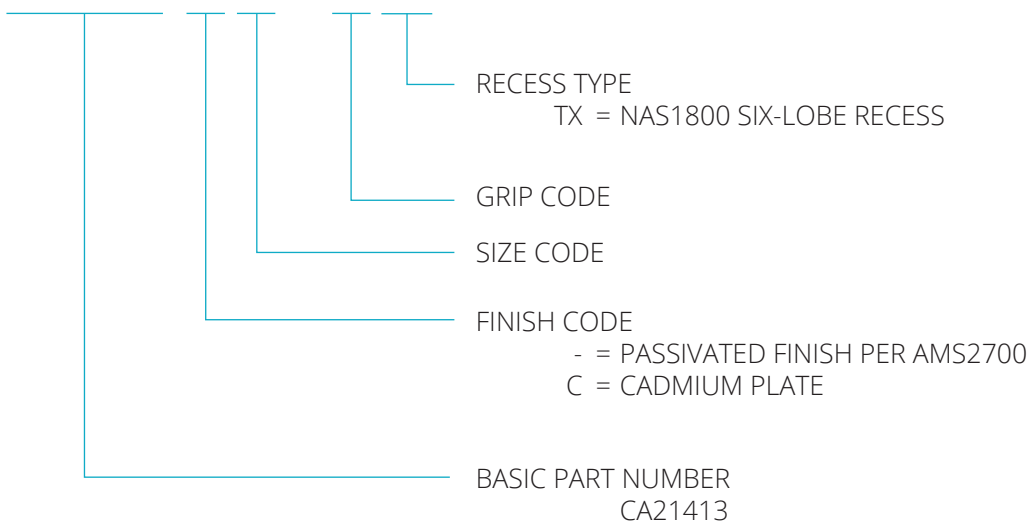


Material: A286 CRES per AMS5731 or AMS5734
Heat Treat: 180 KSI FTU minimum per AMS2759
Finish: Passivated or aluminum coat per NAS4006, Class NC
Recess: Hex recess per ANSI B18.3

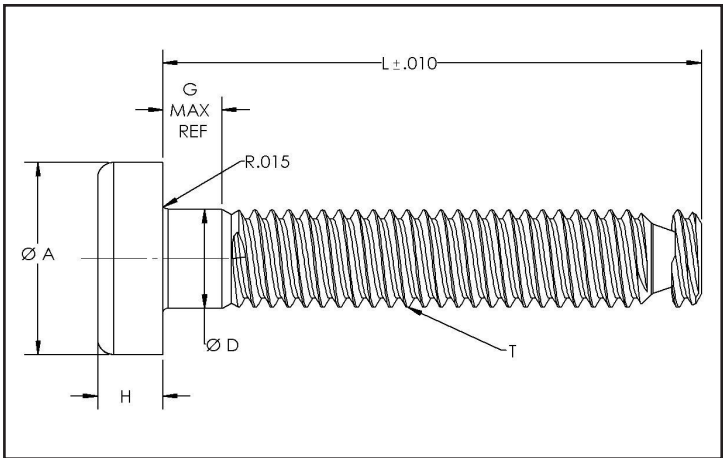
Studs - 130° Flush Shear Head

THREAD LEAD	SIZE	PART NUMBER	T	A MAX	B MIN	D	H REF	K REF	RECESS	G	L
SINGLE	4	CA21413-4-()TX	.2500-28 UNJF-3A	.526	.442	.2495 .2480	.065	.015	T20	SEE TABLE 3	

CA21413 - 4 - 2 HS



Studs - Pan Head

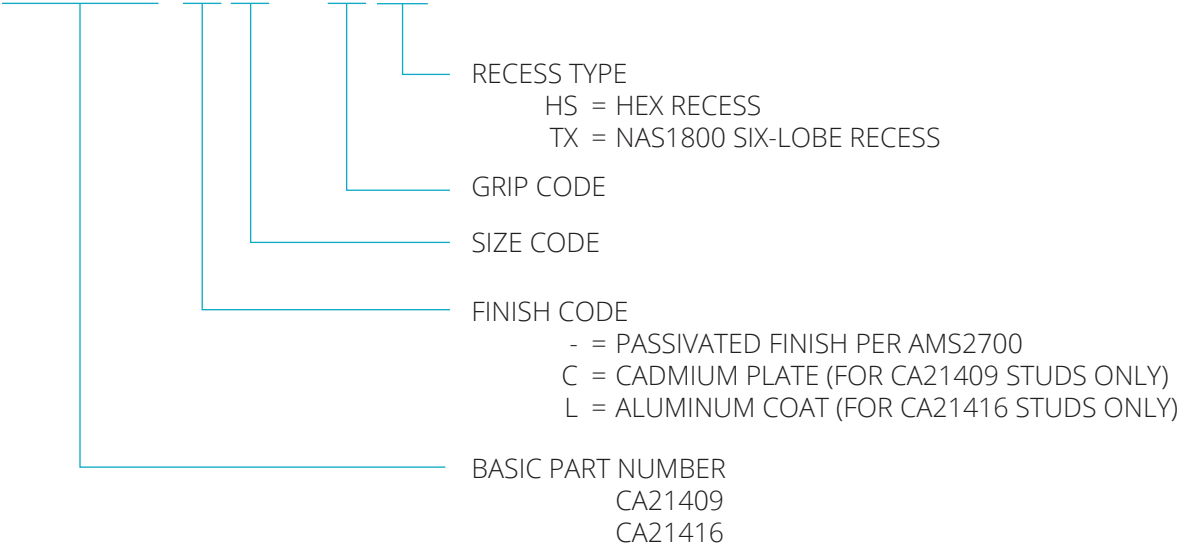


Material: A286 CRES per AMS5731 or AMS5734
Heat Treat: 180 KSI FTU minimum per AMS2759
Finish: Passivated or aluminum coat per NAS4006, Class NC
Recess: Hex recess per ANSI B18.3

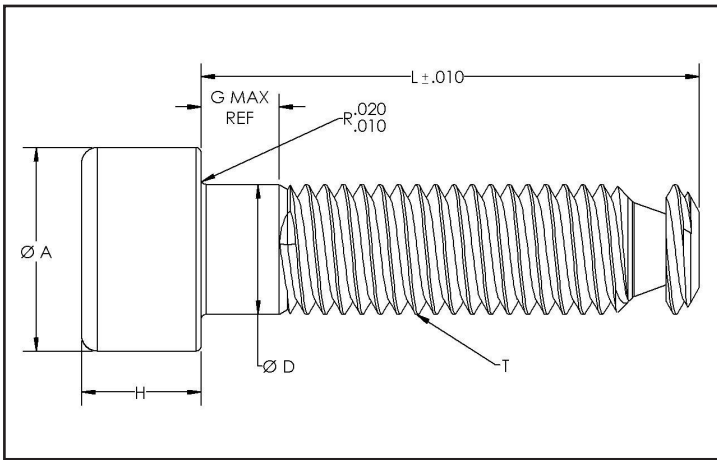
Studs - Pan Head

THREAD LEAD	SIZE	PART NUMBER	T	A MAX	D	H	RECESS	G	L
DOUBLE	3	CA21409-3-()HS	.1900-32 UNJF-3A, 2 LEAD	.374	.1895 .1880	.125 .115	3/32	SEE TABLE 3	
		CA21409-3-()TX					T25		
	4	CA21416-4-()HS	.2500-28 UNJF-3A, 2 LEAD	.492	.2495 .2480	.150 .140	5/32	SEE TABLE 5	

CA21409 - 3 - 2 HS



Studs - Socket Head



Material: A286 CRES per AMS5731 or AMS5734

Heat Treat: 180 KSI FTU minimum per AMS2759

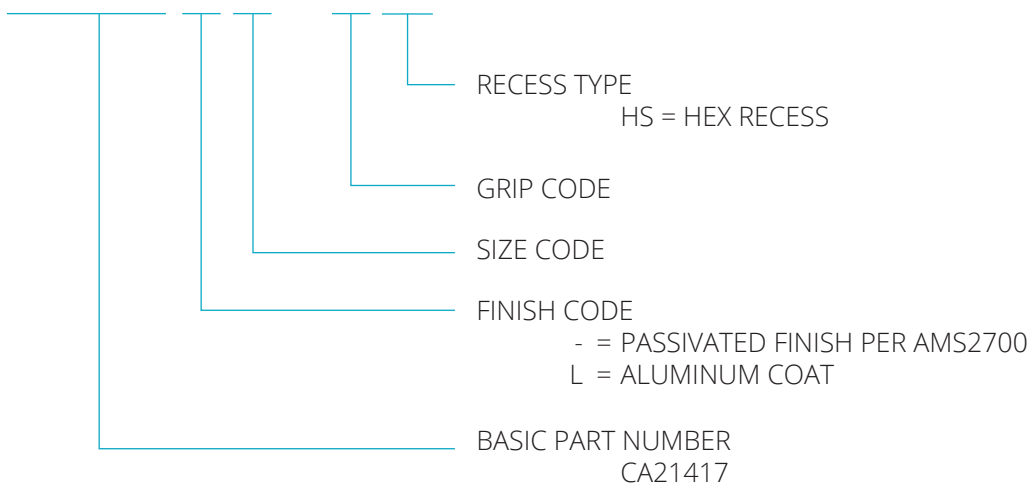
Finish: Passivated or aluminum coat per NAS4006, Class NC

Recess: Hex recess per ANSI B18.3

Studs - Socket Head

THREAD LEAD	SIZE	PART NUMBER	T	A	D	H	RECESS	G	L
DOUBLE	4	CA21417-4-()HS	.2500-28 UNJF-3A, 2 LEAD	.394 .388	.2495 .2490	.236 .229	.198		SEE TABLE 5

CA21417 - 4 - 2 HS



Retainer - Assemblies

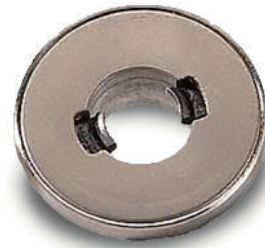
There are three basic types of retainers that may be used with the FC43® studs.

1. Flared
2. Bonded
3. Floating

Flared retainer assemblies are captivated to the panel by flaring the retainer into the countersink in the panel. Flaring is done either with hand tools or with pneumatic powered tooling. Flared retainers have the added benefit of providing an integral grommet for protection of the panel from wear damage. Flared retainer assemblies can only be used with flush head studs.



Bonded retainer assemblies are bonded to the backside of the panel. Bonded retainer assemblies have the advantage of easy and quick installation as well as being compatible with all stud headstyles.



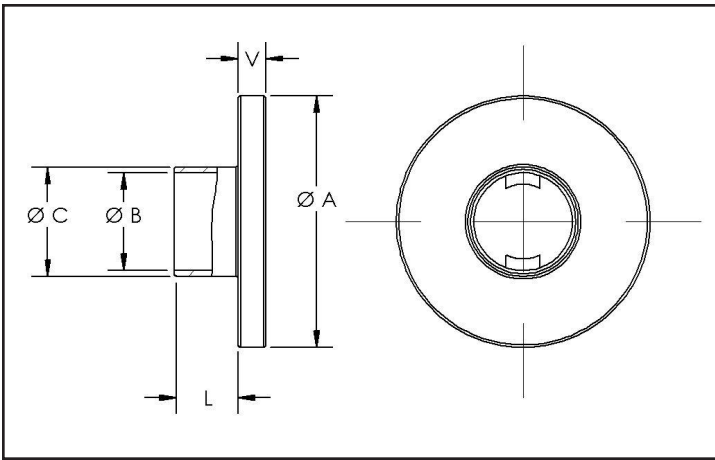
Floating retainer assemblies are identical to the bonded retainer assemblies, and it is only their use that is different. They are not bonded to the panel and they operate like a simple retaining ring. Floating retainer assemblies do not provide a stud hold out capability like a flared or bonded retainer assembly provides.

For standard retainer assemblies, the stud protrudes slightly beyond the back surface of the retainer when the stud is in a fully retracted position. For applications where protrusion of the stud is not desired, retainer assemblies that allow no backside stud protrusion are available. When possible, the standard version is recommended as it is lower in weight and provides a smaller gap between the backside of the panel and the substructure.

When an FC43® panel fastener is replacing another fastener, the hole size in the panel is often smaller due to the higher strength of the FC43® panel fastener design. In this case, special flared retainer assemblies are available to accommodate the larger panel hole size.

For bonded and floating retainer assemblies, standard grommets may be used to provide wear protection for the panel.

Retainers - Flared In



Material:

Main Body: 300 Series CRES

Retaining Ring: PH15-7MO CRES or PH13-8MO CRES

Housing: A286 CRES per AMS5731, AMS5732, AMS5734, AMS5737 or AMS5525

Finish:

Main Body and Housing: Passivated

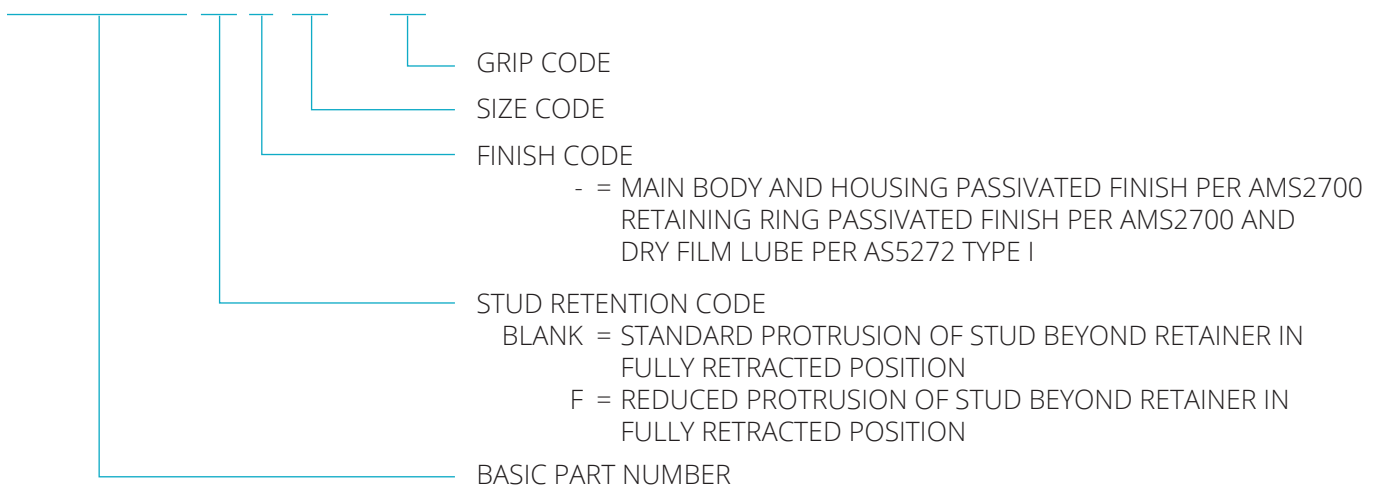
Retaining Ring: Passivated and Dry Film Lube per AS5272 Type I

CA358045-(-)-()

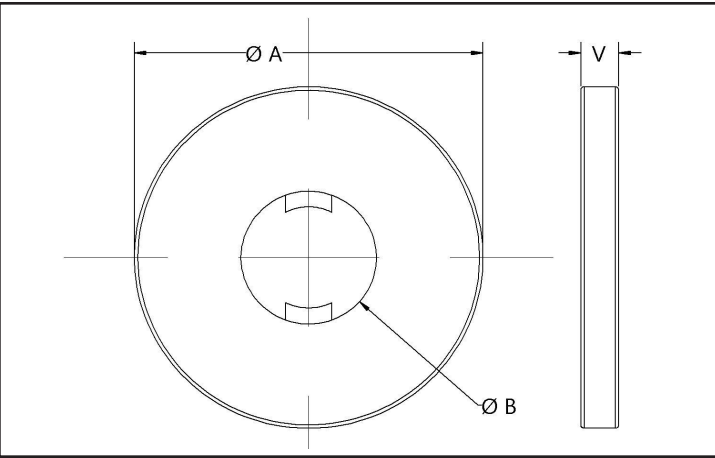
SIZE	ØA±.010	ØB	ØC	V±.010	
				STD	F CODE
08	.441	.169 .166	.190 .185	.050	-
3	.494	.194 .191	.215 .210	.054	.103
4	.579	.254 .251	.274 .269	.060	-

SECOND DASH NUMBER	PANEL THICKNESS		L ±.010
	MIN	MAX	
-1	.075	.095	.105
-2	.096	.115	.125
-3	.116	.135	.145
-4	.136	.155	.165
-5	.156	.175	.185
-6	.176	.195	.205
-7	.196	.215	.225
-8	.216	.235	.245
-9	.236	.255	.265
-10	.256	.275	.285

CA358045 F - 3 - 2



Retainers - Bonded or Floating



Material:

- Main Body:** 300 Series CRES
- Retaining Ring:** PH15-7MO CRES or PH13-8MO CRES
- Housing:** A286 CRES per AMS5731, AMS5732, AMS5734, AMS5737 or AMS5525

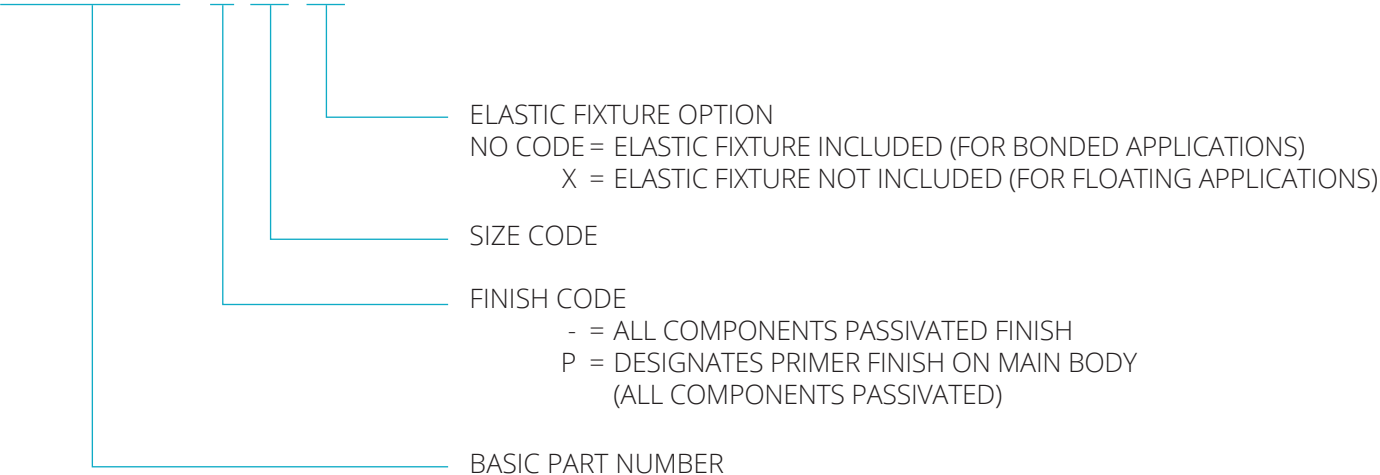
Finish:

- Main Body:** Passivated or Primer finish
- Housing:** Passivated
- Retaining Ring:** Passivated and Dry Film Lube per AS5272 Type I

CA358049-(-)(-)

SIZE	$\varnothing A \pm .010$	$\varnothing B$	$V \pm .010$
08	.440	.172 .166	.048
3	.495	.194 .191	.050
4	.580	.254 .251	.060

CA358049 - 3 X

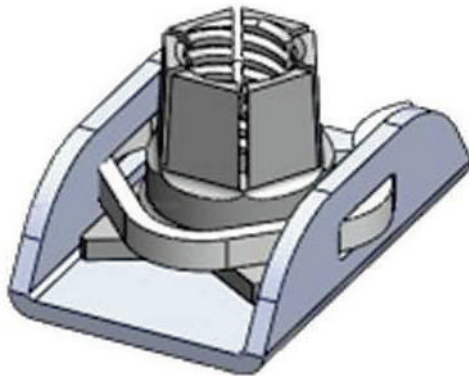


Nutplates

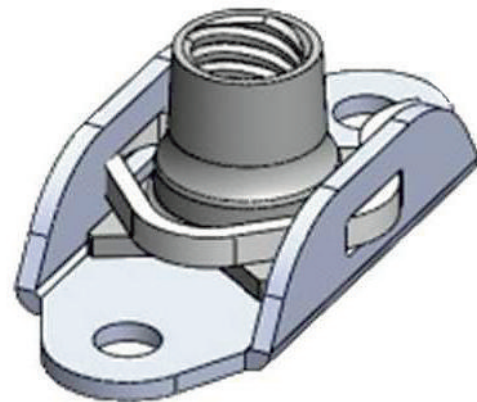
As the FC43® fastening system employs an externally threaded stud, it can be configured to use a multitude of nutplates. The natural choice is to take advantage of the large variety of existing aerospace nuts and select the most adequate for each particular application. Most notable is the full compatibility of the FC43® panel fastener stud with the nutplates used by the well established Mark IV™ panel fastener system. The fact that nuts and stud configurations can be paired with virtually no restrictions gives the system great flexibility and adaptability to diverse operating conditions found in aerospace applications, broadening its scope of usage beyond the realm of regular panel fasteners.

Single lead studs are commonly used with a wide variety of aerospace nutplates. For double lead studs, the three most commonly used nutplates are:

- CA354001- () Double lead, two lug, floating, A286, silver or cadmium plating
- CA354074-3 Double lead, two lug, clip-in, A286, silver or cadmium plating
- CA354077-3 Double lead, bonded, clip-in, A286, silver



FlatBeam™ nut on bonded type metallic basket



Sheetmetal nut on riveted metallic basket

Panel Preparation

For flush head studs, prepare panel in accordance with Figure 1 or 2 and the dimensions shown in the table below. For protruding head studs, prepare panel in accordance with Figure 3 or 4 and the dimensions shown in the table below. The counterbore option (Figures 2 and 4) may be used if the offset necessary for the retainer between the panel and substructure is not suitable for the application. Counterbores should not be used in panels where the thickness (T) is less than the minimum T shown in the table below.

For thin panels where counterboring is not an option, a counterbore in the substructure may be an option in some applications. While the dimensions shown in the table below may be used as a guideline for hole preparation, it is recommended that the final dimensions for the application be developed on a test panel, particularly for flush head studs, to ensure optimal flushness.

Stud		Retainer		Size	A	B	D	E min	F min	Tmin (no counterbore)	Tmin (counterbore)
Headstyle / Part Numbers		Retainer Style / Part Numbers									
100° Flush Shear	CA21403 CA21410 CA21411 CA21412 CA21415	Flared	CA358045	08	101 99	.295 .285	.195 .191	.450	.063	.075	.143
				3		.340 .330	.220 .216	.505	.065	.075	.145
				4		.423 .413	.281 .276	.590	.075	.086	.166
		Bonded	CA358049	08	101 99	.265 .255	.171 .167	.450	.065	.058	.128
				3		.305 .295	.197 .193	.505	.069	.066	.140
				4		.400 .390	.258 .254	.590	.075	.085	.165
100° Flush Tension	CA21406	Bonded	CA358049	08	101 99	.332 .322	.171 .167	.450	.065	.086	.156
				3		.386 .376	.197 .193	.505	.069	.100	.174
				4		.510 .500	.258 .254	.590	.075	.132	.212
130° Flush Shear	CA21413	Bonded	CA358049	4	131 129	.518 .508	.258 .254	.590	.075	.086	.166
Protruding	CA21409 CA21416 CA21417	Bonded	CA358049	08			.171 .167	.450	.065	.016	.086
				3			.197 .193	.505	.069	.018	.092
				4			.258 .254	.590	.075	.023	.103

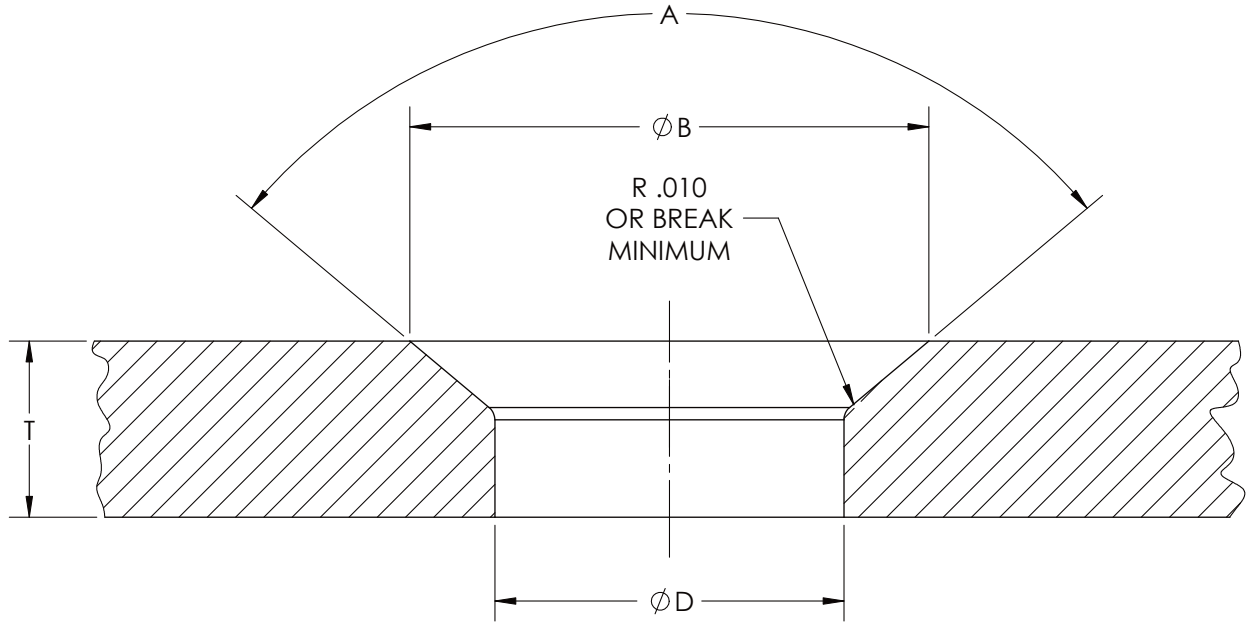


Figure 1: Panel Preparation for Flush Head Studs

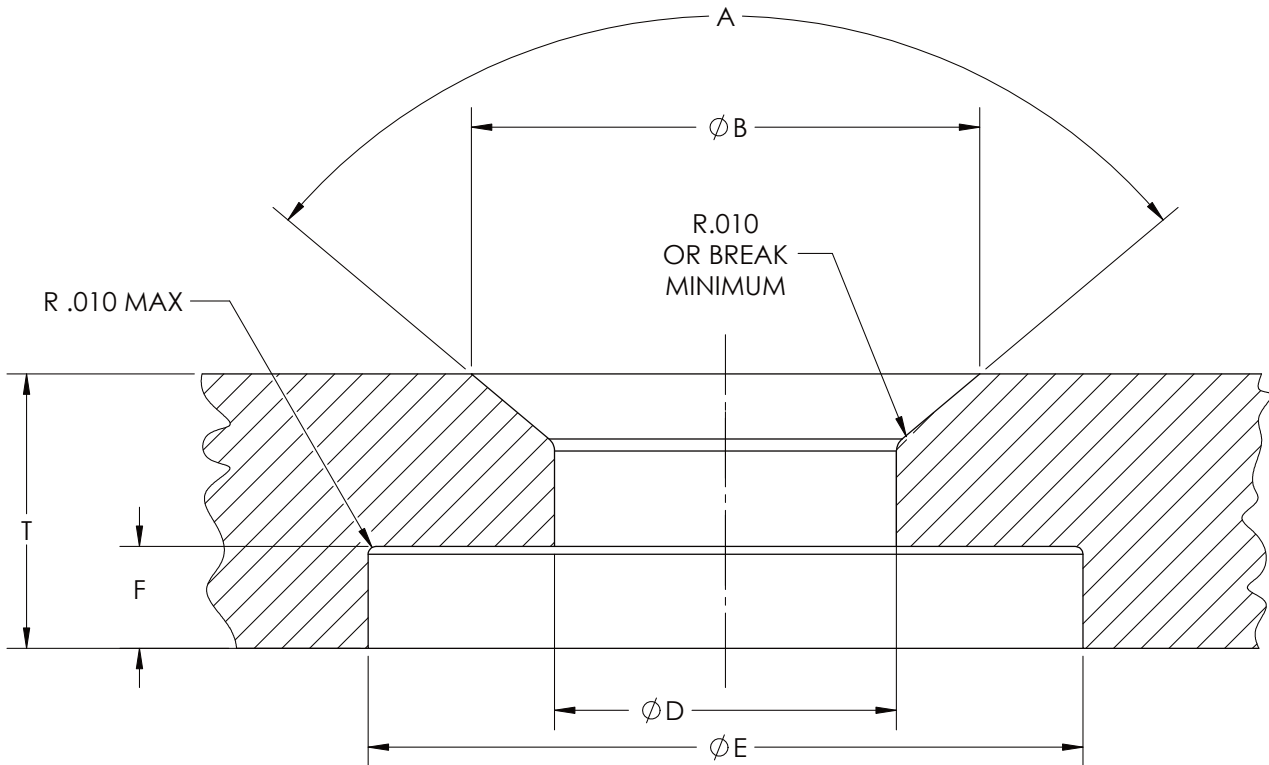


Figure 2: Panel Preparation for Flush Head Studs with Counterbore

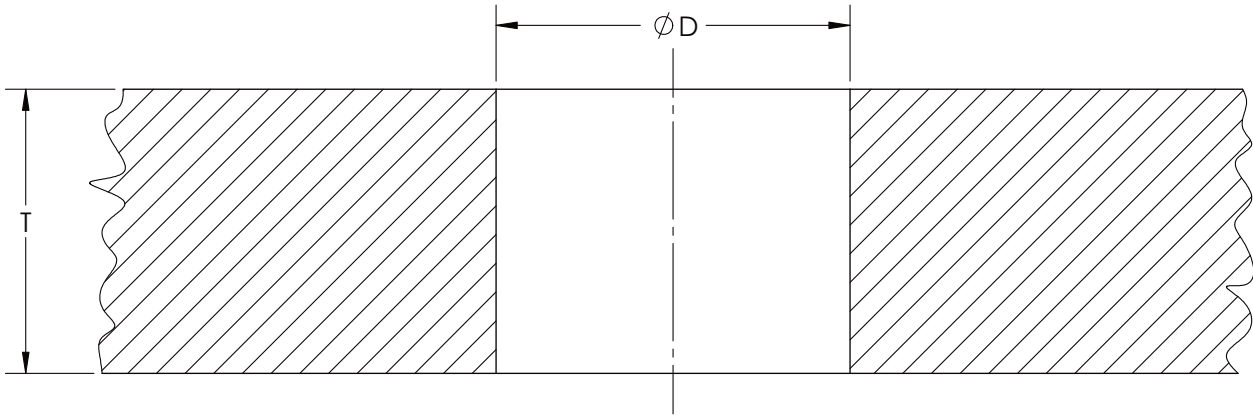


Figure 3: Panel Preparation for Protruding Head Studs

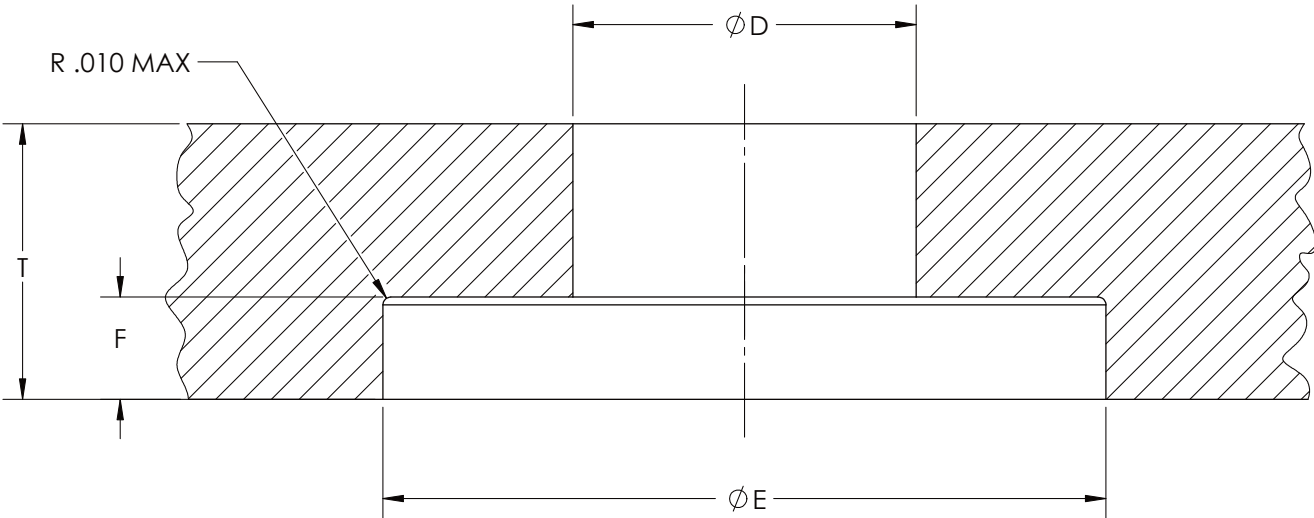


Figure 4: Panel Preparation for Protruding Head Studs with Counterbore

Retainer Installation

Installation of the FC43® panel fastener involves captivation of the stud to the panel and installation of the nutplate to the substructure.

Retainer Installation

There are three basic options for captivating the stud to the panel.

1. **Grommeted Retainer Assembly** - This option is the most common and has the advantage of providing a grommet in the panel hole, providing high wear resistance as well as providing hold-out in all positions. This option is not suitable for protruding head studs.
2. **Bonded Retainer Assembly** - This option provides ease of installation, as well as providing hold-out in all positions. It can be paired with a grommet to provide high wear resistance. This option is suitable for all studs.
3. **Floating Retainer Assembly** - This option provides the simplest installation of all options, but it does not provide hold-out.

Grommeted Retainer Assembly - The grommet assembly can be installed either using pneumatic riveter or torque-controlled hand tools.

Pneumatic Riveter Installation - The pneumatic riveter, part number **CA358045-PT1-()**, includes the body of the tool, a custom nose piece, part number **CA358045-()-000** and a load control valve (see Figure 7). The -3 pneumatic riveter and nose piece is used to install retainer sizes -08 and -3, while the -4 pneumatic riveter is used to install retainer size -4.

1. Preset the control valve to the value shown in Figure 7. This recommended value was developed in composite material and it is recommended that the user perform some test installations in scrap material prior to installation in the panel to verify that this setting results in a complete installation with no cracking of the grommet or damage to the material.
2. Insert the grommet into the prepared panel (Figure 5).
3. Insert the flaring pull-stem, either the plunger type **CA358045-()-T10P** (preferred) or the one-piece **CA358045-()-T10**, through the cylindrical portion of the grommet protruding above the countersink in the panel (Figure 6).
If using the plunger type, press down on the plunger until it firmly engages with the grommet. Note: the plunger type has a spring action which exerts a slight force on the panel while the stem engages the bore of the grommet, easing the installation process by providing the pull stem with greater stability.
4. Engage the grooves on the pull stem with the pneumatic riveter, supporting the head side of the pull stem to prevent it from being pushed out. Support of the head side is more critical for the one-piece pull stem.
5. Depress the trigger of the pneumatic riveter, releasing after the flaring process is complete.
6. Remove the pull stem from installed grommet.
7. Visually inspect the grommet installation, verifying that there are no cracks in the grommet, that the grommet is seated in the countersink and that there are no gaps between the backside of the retainer and the backside of the panel.



Figure 5

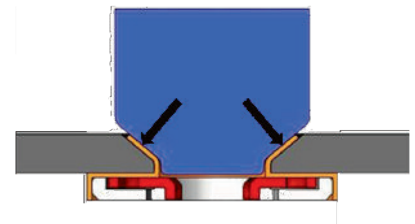
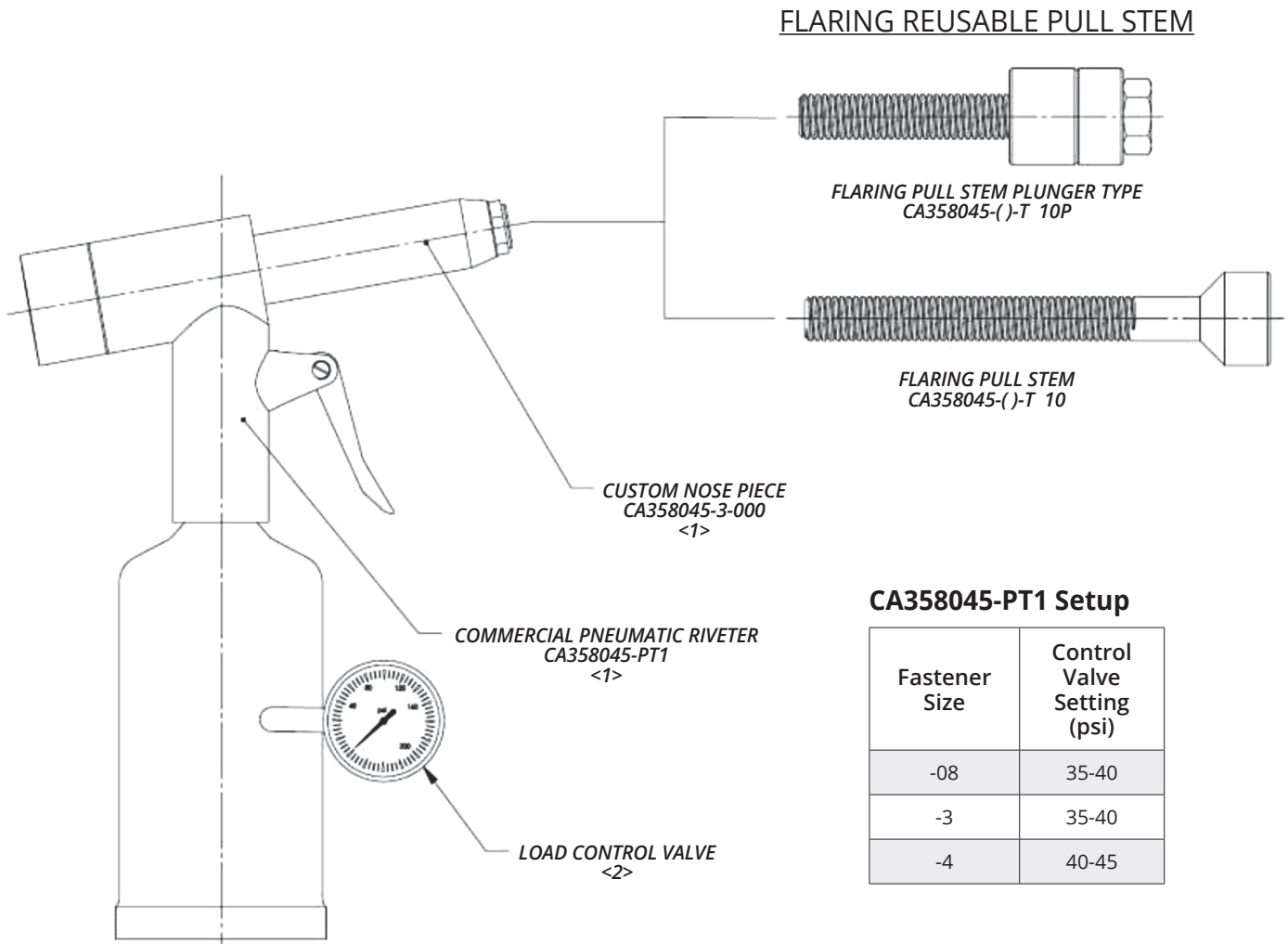


Figure 6

Retainer Installation



CA358045 - 3 - T10 ()

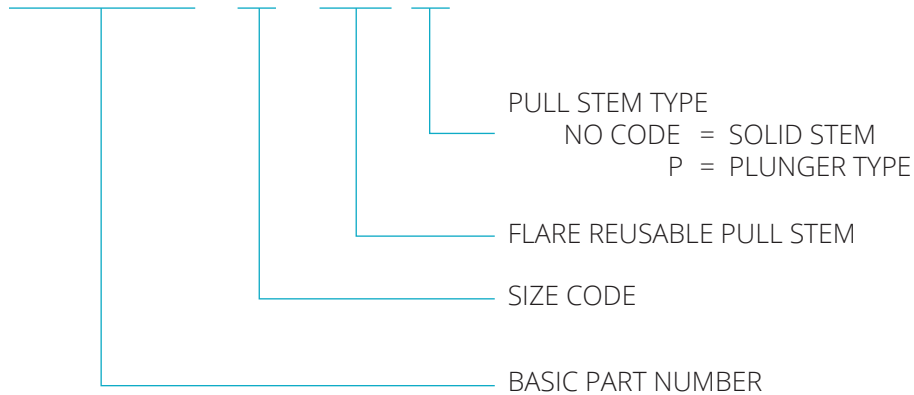
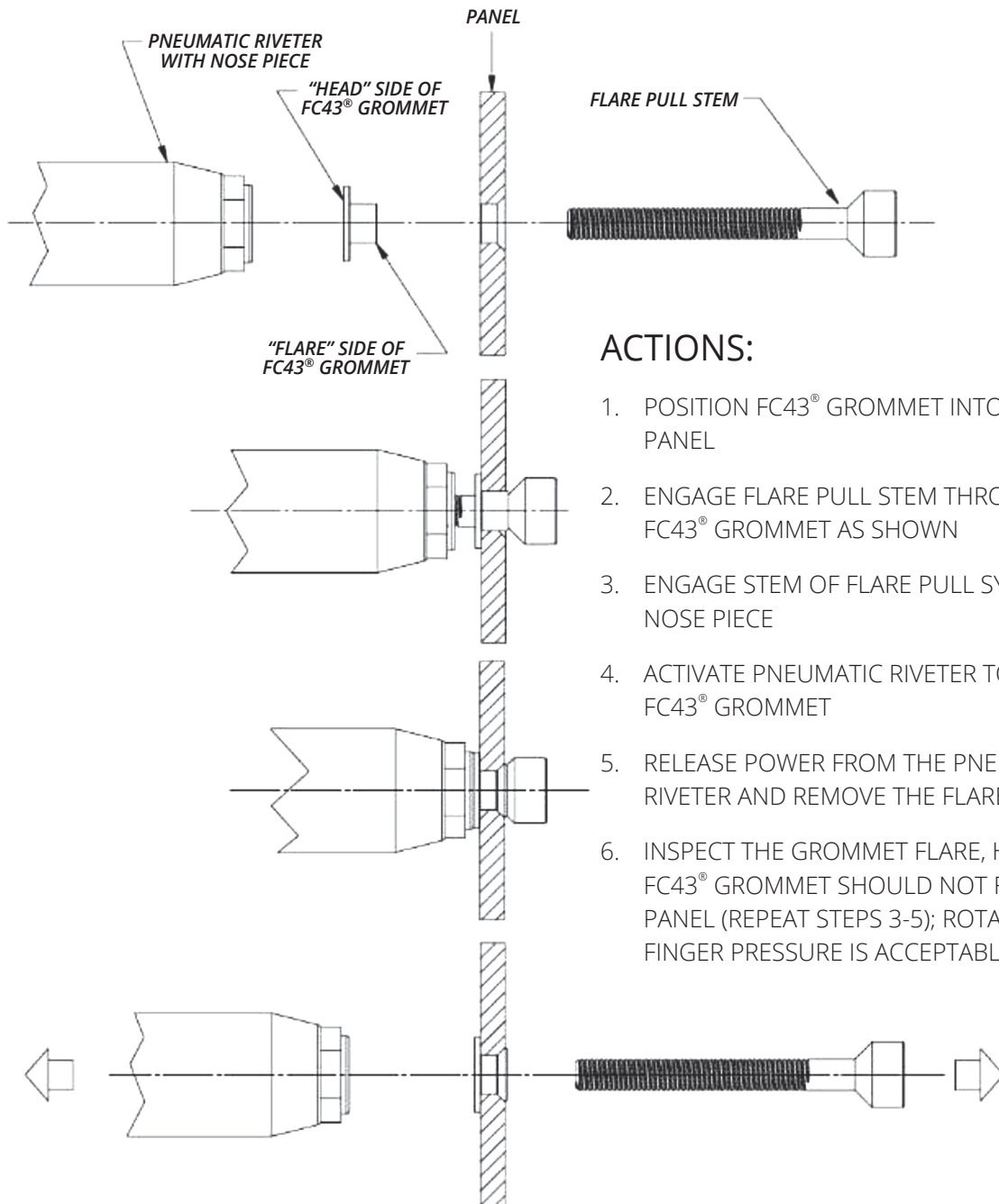


Figure 7

Retainer Installation

INSTALLATION EXAMPLE PNEUMATIC PULLER WITH FLARE PULL STEM

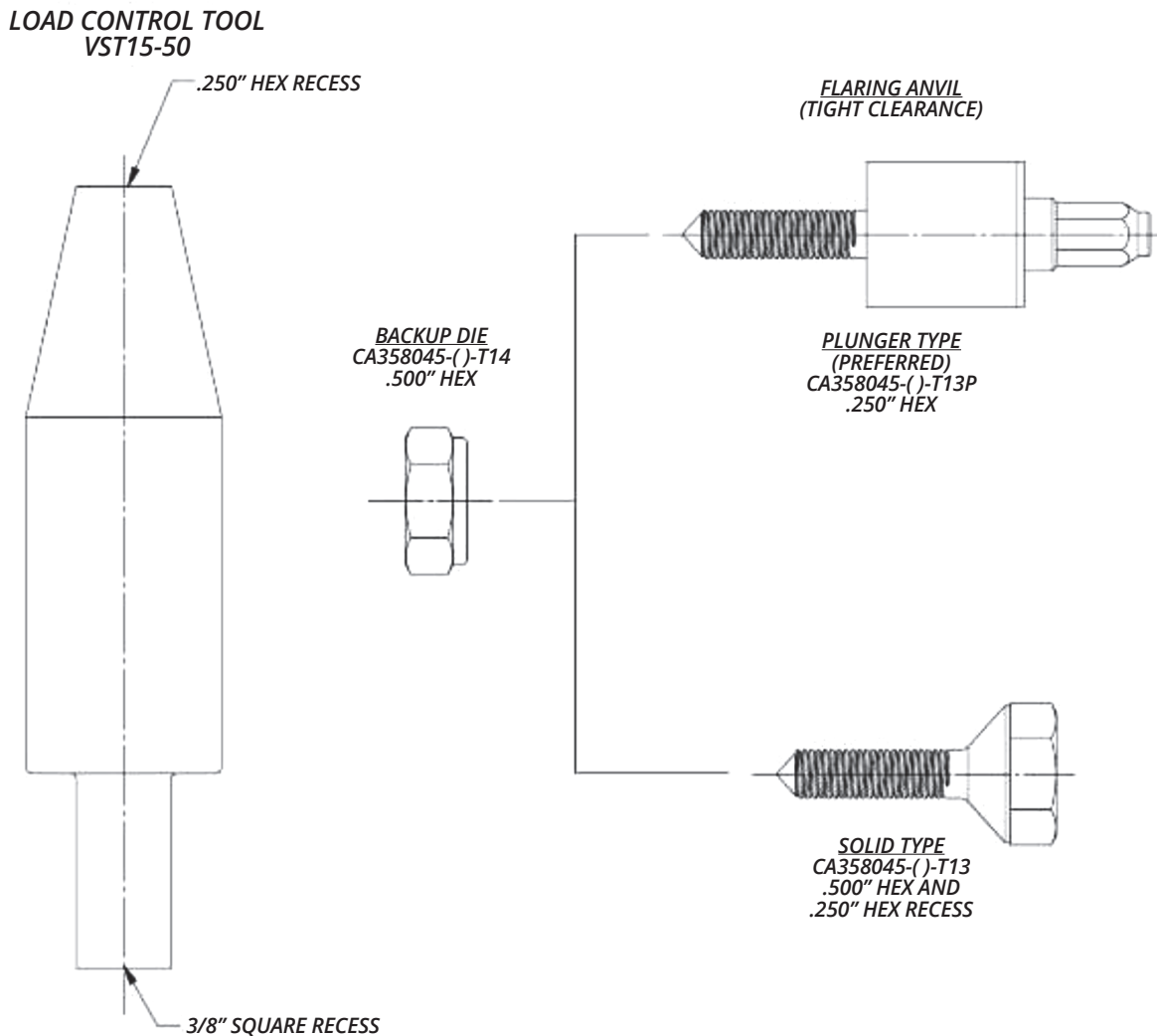


ACTIONS:

1. POSITION FC43® GROMMET INTO HOLE IN PANEL
2. ENGAGE FLARE PULL STEM THROUGH THE FC43® GROMMET AS SHOWN
3. ENGAGE STEM OF FLARE PULL SYSTEM INTO NOSE PIECE
4. ACTIVATE PNEUMATIC RIVETER TO FLARE THE FC43® GROMMET
5. RELEASE POWER FROM THE PNEUMATIC RIVETER AND REMOVE THE FLARE PULL STEM
6. INSPECT THE GROMMET FLARE, HEAD OF FC43® GROMMET SHOULD NOT FREE SPIN IN PANEL (REPEAT STEPS 3-5); ROTATION UNDER FINGER PRESSURE IS ACCEPTABLE¹

1. After repeated panel "flexing," grommet may begin to spin. This is normal but if not desired repeat steps 3-5.

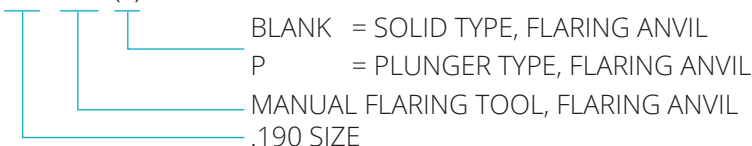
Retainer Installation - Manual



NOTES: UNLESS OTHERWISE SPECIFIED:

1. THE LOAD CONTROL TOOL CAN BE USED ON EITHER THE FLARING OR BACKUP DIE SIDE, ADAPTERS AND HEX SOCKETS MAY BE REQUIRED
2. VST15-50 WILL BE PRE-SET TO 35-40 IN-LBS (VERIFY BEFORE USE)
NOTE: PRESSURE IS SET FOR COMPOSITE PANEL INSTALLATION, PRESSURE SHOULD BE INCREASED OR DECREASED IF USING A DIFFERENT MATERIAL
3. HEX AND SQUARE SIZES ARE THE SAME FOR .190 AND .250 SIZE TOOLS
4. PART NUMBER EXAMPLE:

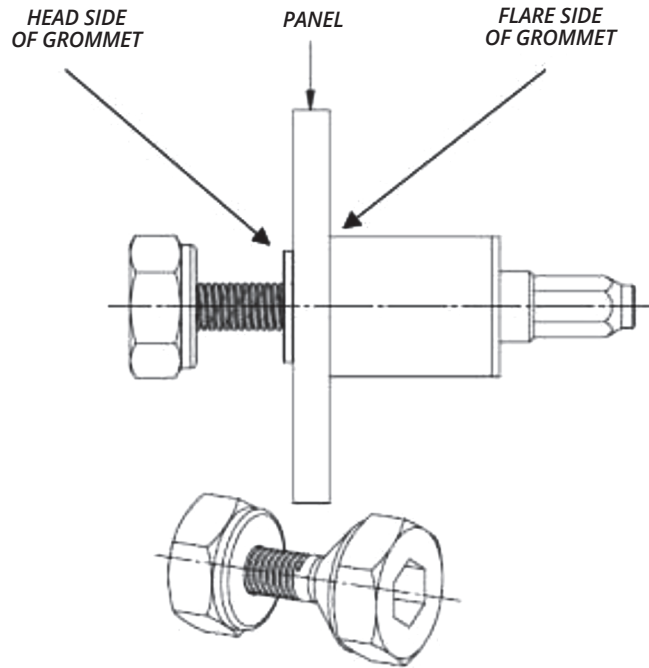
4.1 CA358045 - 3 - T13 ()



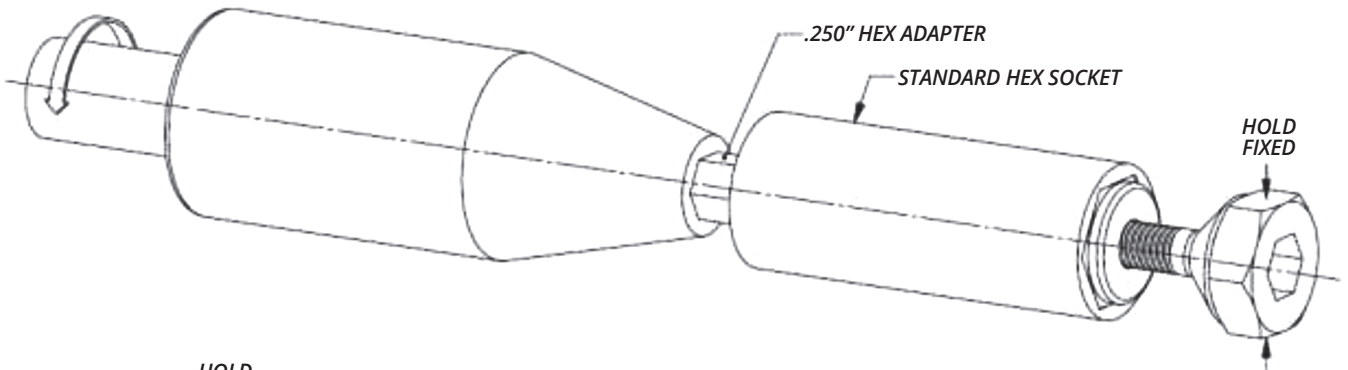
4.2 CA358045 - 3 - T14



Retainer Installation - Manual



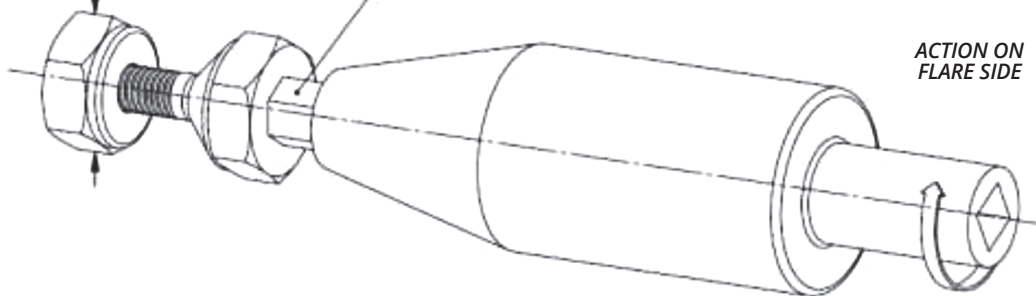
*(PREFERRED)
ACTION ON HEAD
SIDE OF GROMMET*



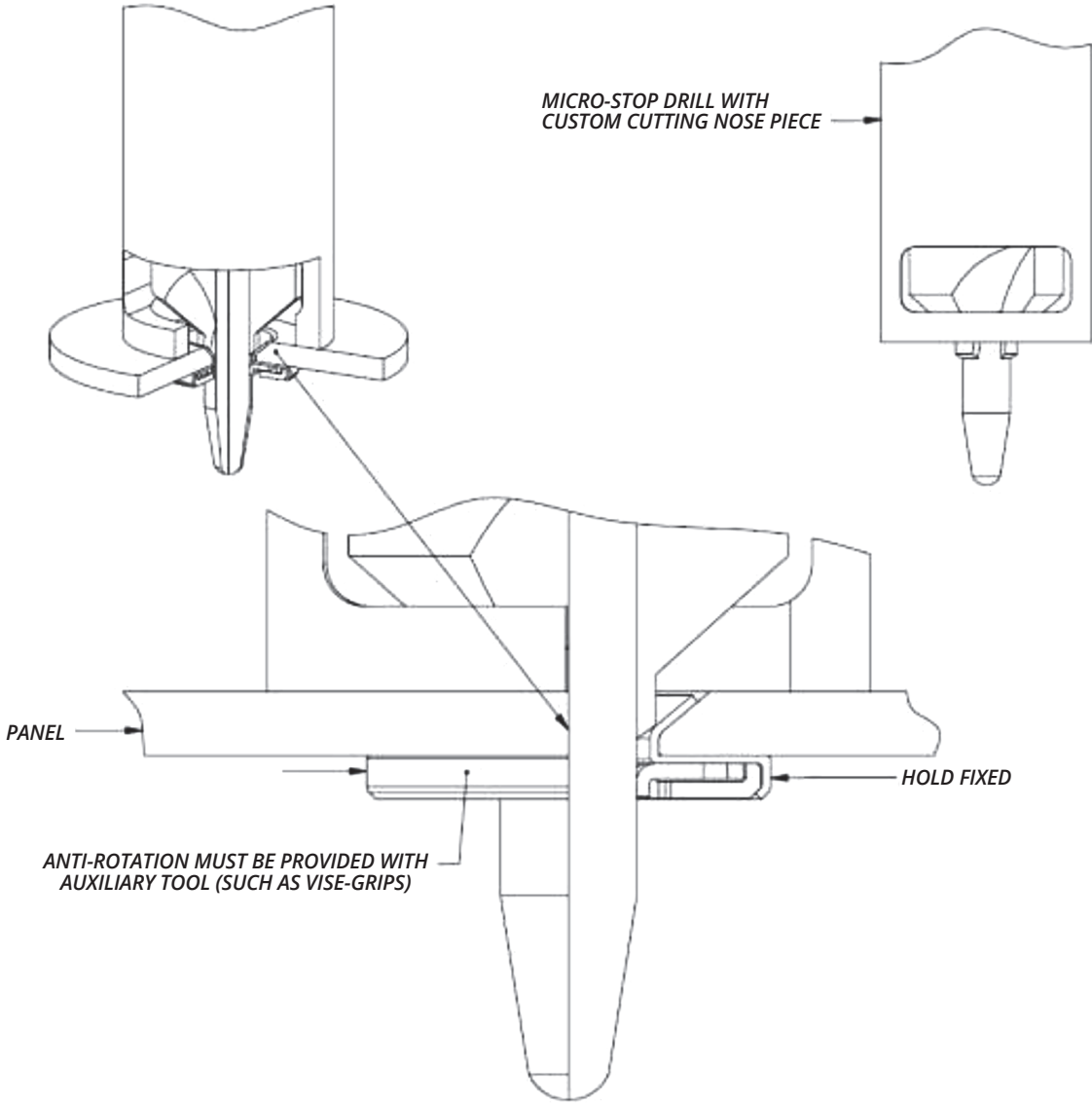
*HOLD
FIXED*

.250" HEX ADAPTER

*ACTION ON
FLARE SIDE*



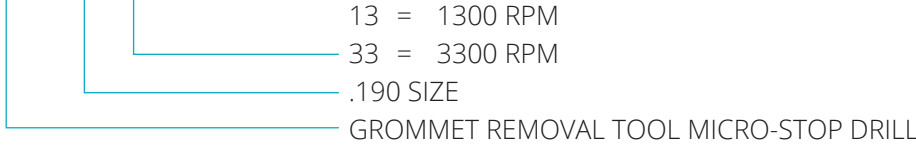
Retainer Removal



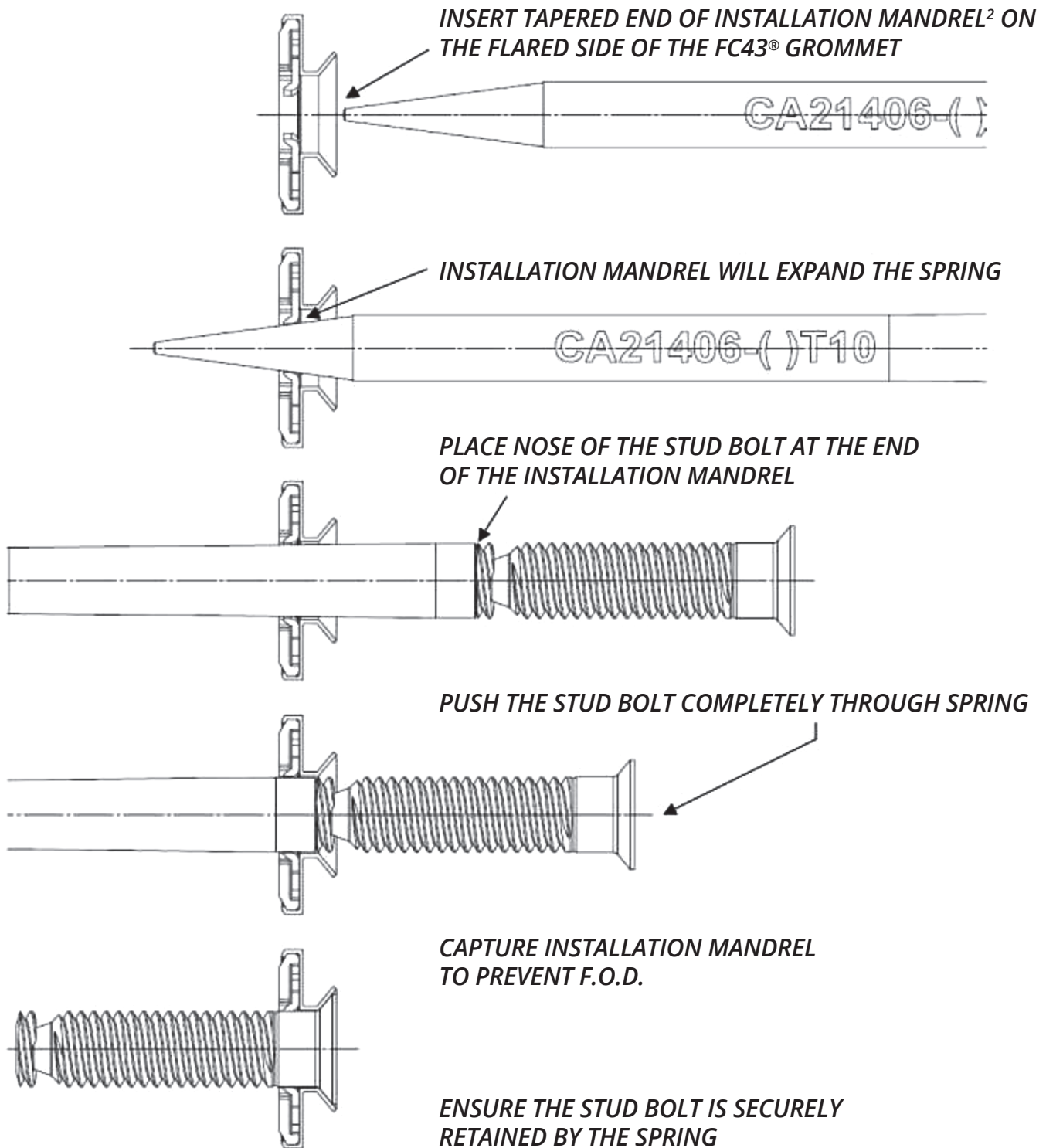
NOTES (UNLESS OTHERWISE SPECIFIED):

- 1. ATTACHES TO COMMERCIAL ELECTRIC DRILL
- 2. CUTS ONLY FILLET PORTION OF FLARED GROMMET
- 3. ACCURATE DEPTH CONTROL
- 4. CENTER PILOT ENSURES ALIGNMENT
- 5. PART NUMBER EXAMPLE:

5.1 DT358045 - 3 - 13



Stud Installation

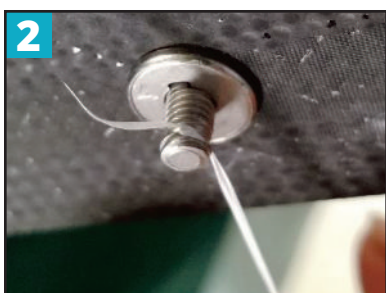


2. SEE SALES DRAWING CA21406-()T10 FOR SIZE DETAILS

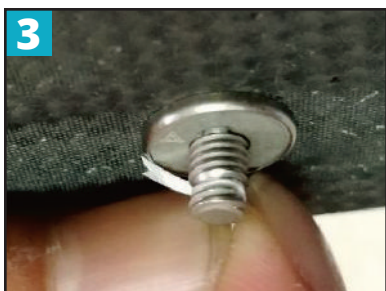
Stud Removal



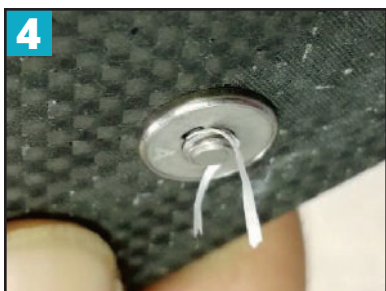
Push the “hook” of the stud bolt beyond the retaining ring of the FC43® grommet.



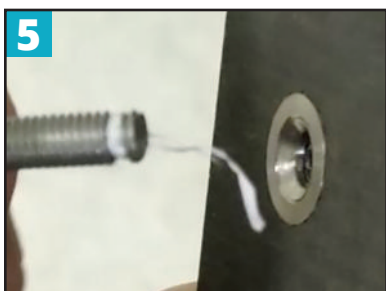
Using plumbing tape, dental floss or similar, begin wrapping the tape around the “hook” portion of the stud bolt.



Stop wrapping when the “hook” has been filled by the tape.



Pull the stud bolt out of the FC43® grommet (if the stud bolt does not come out, continue wrapping the tape around the “hook”).



Once the stud bolt is removed from the panel, unwrap the tape and discard.

With a bolt design that is free of slots or axial recesses, the FC43® fastener provides higher mechanical performance for a given diameter than existing equivalent panel fasteners.



Installation Tooling

Howmet Fastening Systems offers a full-line of installation tools for the FC43® panel fastener. The table below provides a list of the tools necessary for each of the installation/removal processes: powered retainer installation, manual retainer installation, stud installation and retainer removal.

Installation Tooling

PROCESS	DESCRIPTION	PART NUMBER
Retainer installation, powered	Pneumatic riveter	CA358045-PT1-3
Retainer installation, powered	Pneumatic riveter	CA358045-PT1-4
Retainer installation, powered	Nose piece	CA358045-3-000
Retainer installation, powered	Nose piece	CA358045-4-000
Retainer installation, powered	Flaring pull-stem, plunger type	CA358045-()-T10P
Retainer installation, powered	Flaring pull-stem, solid type	CA358045-()-T10
Retainer installation, powered	Pneumatic torque-control tool	CA358045-3-T13S
Retainer installation, manual	Load control tool	VST15-50
Retainer installation, manual	Flaring anvil, plunger type	CA358045-()-T13P
Retainer installation, manual	Flaring anvil, solid type	CA358045-()-T13
Retainer installation, manual	Backup die	CA358045-()-T14
Retainer removal	Micro-stop drill	DT358045-()-()
Stud installation	Installation mandrel	CA21406-()T10



Fastening Torque

The torque values listed in the table below may be used as guidance to determine the appropriate torque value for the FC43® studs securing a panel. Verify that the installation torque will not damage the panel, substructure and any material in between the panel and substructure, nor cause excessive deflection. Verify that the mating nutplate has torque out capability in excess of the maximum permissible fastening torque.

Installation Torque (lbf-in)

	CA21403-3-00	CA21411-3-0TX	CA21412-3-0TX	CA21406-0-0HS	CA21409-3-0TX	CA21406-0-0HS	CA21410-0-0HS	CA21413-4-0TX	CA21415-4-0TX	CA21416-4-0HS	CA21417-4-0HS
Size											
08					30*		37*				
3		25-35			36*		85*				
4					60*		160*	60*			

*Minimum

Driver Bit

	CA21403-3-0TX	CA21411-3-0TX	CA21412-3-0TX	CA21406-0-0TX	CA21409-3-0TX	CA21413-4-0TX	CA21415-4-0TX	CA21403-3-0HS	CA21409-3-0HS	CA21406-0-0HS	CA21410-0-0HS	CA21416-4-0HS	CA21417-4-0HS
Size													
08				T20						3/32			
3		T15		T20	T25			3/32		1/8			
4				T30		T20				5/32		5/32	0.198

Mechanical Properties

Shear Strength (lbf)*

Size	CA21403-3-00	CA21409-3-00	CA21411-3-0TX	CA21412-3-0TX	CA21406-0-00	CA21415-4-0TX	CA21410-0-0HS	CA21413-4-0TX	CA21416-4-0HS	CA21417-4-0HS
08					2,075		1,590			
3	2,325				2,790		2,250			
4					4,842	3,502** 4,842	4,140	3,258	4,744	

* Calculated shear strength through the full shank

** Calculated shear strength through the recess

Tensile Strength (lbf)*

Size	CA21403-3-00	CA21409-3-00	CA21410-0-0HS	CA21411-3-0TX	CA21412-3-0TX	CA21406-0-00	CA21413-4-0TX	CA21415-4-0TX	CA21416-4-0HS	CA21417-4-0HS
08			1,950			2,142				
3			2,150			3,060				
4			4,160			5,569	5,430	4,160	3,484	

*Calculated tensile strength

Weight - Stud, Retainer, Nutplate

Stud - Weight (lbs/100 pieces)*

Grip Code	CA21403-3-00	CA21406-08-00	CA21406-3-00	CA21406-4-00	CA21413-4-0TX	CA21415-4-0TX
2	.56	.28	.43	.86	1.03	1.12
3	.61	.32	.48	.95	1.11	1.22
4	.66	.35	.53	1.04	1.20	1.32
5	.71	.39	.58	1.12	1.29	1.42
6	.76	.43	.63	1.21	1.37	1.52
7	.81	.47	.68	1.30	1.46	1.61
8	.86	.50	.73	1.38	1.55	1.71
9		.54	.78	1.47		1.81
10		.58	.83	1.56		1.91
11		.62	.88	1.65		2.00
12		.65	.93	1.73		2.10
13		.69	.98	1.82		2.20
14		.73	1.03	1.91		2.30
15		.77	1.08	2.00		
16		.80	1.13	2.08		
17		.84	1.18	2.17		
18		.88	1.23	2.26		
19		.92	1.28	2.35		
20		.95	1.33	2.43		
21		.99	1.38	2.52		
22		1.03	1.44	2.61		
23		1.07	1.49	2.70		
24		1.10	1.54	2.78		
25		1.14	1.59	2.87		
26		1.18	1.64	2.96		
27		1.22	1.69	3.05		
28		1.25	1.74	3.13		
29		1.29	1.79	3.22		
30		1.33	1.84	3.31		
31		1.37	1.89	3.40		

Retainer - Weight (lbs/100 pieces)*

Grip Code	CA358045-08-0	CA358045-3-0	CA358045F-3-0	CA358045-4-0
1	.218	.262	.464	.393
2	.221	.265	.467	.398
3	.224	.268	.470	.403
4	.227	.271	.473	.408
5	.230	.274	.476	.413
6				.418
7				.423
8				.428
9				.433
10				.438
11				.443
12				.448
13				.453
14				.458
15				.463
16				.468
17				.473
18				.478
19				.483
20				.488

Nutplate - Weight (lbs/100 pieces)*

Size	CA354001-0	CA354074-0	CA354077-0
3		.70	.65
4	.76		

*Approximate weight



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