

PennEngineering®

MINIATURE SELF-CLINCHING  
FASTENERS



BULLETIN

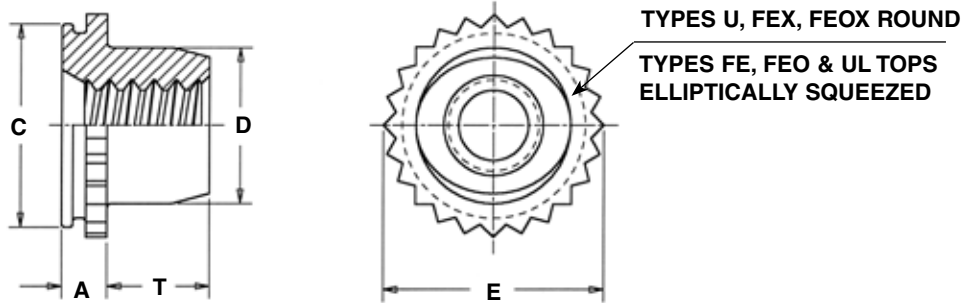
FE





# MINIATURE SELF-CLINCHING FASTENERS

## SPECIFICATIONS



All dimensions are in inches.

	Thread Size	Type		Thread Code	Shank Code (2)	A (Shank) Max.	Sheet Thickness (3)	Hole Size In Sheet +.003 - .000	C +.000 - .005	D Max.	E ±.005	T +.015 - .000	Min. Dist. Hole $\varnothing$ To Edge	Max. Hole In Attached Parts
		Non-locking(1)	Self-locking											
UNIFIED	.060-80 (#0-80)	U	UL	080 <sup>NS</sup>	0	.020	.019-.022	.110	.1095	.076	.125	.050	.09	.080
	.073-64 (#1-64)	U	UL	164 <sup>NS</sup>	0	.020	.019-.022	.110	.1095	.090	.125	.050	.09	.093
	.086-56 (#2-56)	U	UL	256	0	.020	.019-.022	.144	.1435	.106	.160	.065	.11	.106
					1	.031	.030-.036							
	.112-40 (#4-40)	FEOX	FEO	440		.040	.039-.045	.172	.171	.145	.192	.065	.14	.132
	.138-32 (#6-32)	FEOX	FEO	632		.040	.039-.045	.213	.212	.180	.244	.075	.17	.158
	.164-32 (#8-32)	FEOX	FEO	832		.040	.039-.045	.290	.289	.215	.322	.090	.20	.184
	.190-32 (#10-32)	FEOX	FEO	032		.040	.039-.045	.290	.289	.245	.322	.110	.20	.210
1/4-20	FEX <sup>NS</sup>	FE	0420		.060	.059-.070	.344	.343	.318	.384	.120	.28	.270	
1/4-28			0428											

All dimensions are in millimeters.

	Thread Size x Pitch	Type		Thread Code	Shank Code (2)	A (Shank) Max.	Sheet Thickness (3)	Hole Size In Sheet +0.08	C -0.13	D Max.	E ±0.13	T +0.4	Min. Dist. Hole $\varnothing$ To Edge	Max. Hole In Attached Parts
		Non-locking(4)	Self-locking											
METRIC	M2 x 0.4	U	UL	M2 <sup>NS</sup>	1	0.76	0.76-0.91	3.61	3.6	2.5	4.07	1.65	2.8	2.5
	M3 x 0.5	FEOX	FEO	M3		1.02	0.99-1.14	4.39	4.37	3.96	4.88	1.9	3.6	3.5
		FEX	FE			1.53	1.5-1.78							
	M4 x 0.7	FEOX	FEO	M4		1.02	0.99-1.14	7.39	7.37	5.23	8.17	2.55	5.2	4.5
		FEX	FE			1.53	1.5-1.78							
	M5 x 0.8	FEOX	FEO	M5		1.02	0.99-1.14	7.39	7.37	6.48	8.17	3.05	5.2	5.5
FEX		FE	1.53			1.5-1.78								
M6 x 1	FEX	FE	M6 <sup>NS</sup>		1.53	1.5-1.78	8.74	8.72	7.72	9.74	3.3	7.1	6.5	

(1) 2B Go Gauge may stop at barrel end but class 3A screw will pass thru with finger torque.

(2) Shank code applicable only to Types U and UL fasteners.

(3) In applications between the sheet thicknesses for your thread size, see last paragraph of installation data on page FE-6. Knurled collar may fracture if fastener is used in sheets thicker than the specified range and the screw is tightened beyond maximum tightening torque.

(4) 6H Gauge may stop at barrel but 4h screw will pass thru with finger torque.

NS Not Stocked. Available on special order.

# MINIATURE SELF-CLINCHING FASTENERS

## MATERIAL AND FINISH SPECIFICATIONS

Type	Threads		Fastener Material	Standard Finishes			For Use In Sheet Hardness (1)
	Internal, ANSI B1.1, 2B / ANSI / ASME B1.13M, 6H	Internal, MIL-S-8879, UNJ-3B, ANSI B1.21M, MJ 4H6H 4H5H (M6 thread)		303 Stainless Steel	Passivated and/or Tested Per ASTM A380	Passivated Plus Clear Dry-film Lubricant	
U	•		•	•			•
UL		•	•		•		•
FE		•	•			•	•
FEX	•		•	•			•
FEO		•	•			•	•
FEOX	•		•	•			•
Part number codes for finishes				None	CW	MD(2)	

(1) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

(2) Visit our web site for details on MD finish specifications.

## PERFORMANCE DATA FOR TYPES U AND UL<sup>(3)</sup>

UNIFIED	Type	Thread Code	Shank Code	Max. Rec. Tightening Torque (in. lbs.) (4)	Type UL Locking Torque (in. oz.) (5)	Test Sheet Material					
						5052-H34 Aluminum			Cold-rolled Steel		
						Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
U & UL	080	0	0	1	1 To 12	750	20	2	1000	30	2
						750	20	3	1000	30	3
	256	0	1	1.8	3 To 24	1000	20	4	1300	30	4

METRIC	Type	Thread Code	Shank Code	Max. Rec. Tightening Torque (N•m) (4)	Type UL Locking Torque (N•m) (5)	Test Sheet Material					
						5052-H34 Aluminum			Cold-rolled Steel		
						Installation (kN)	Pushout (N)	Torque-out (N•m)	Installation (kN)	Pushout (N)	Torque-out (N•m)
U & UL	M2	1	0.3	0.02 To 0.2	4	89	0.45	5.8	133	0.45	

(3) The values above are representative of pushout and torque-out resistance between the shank of the fastener and the sheet. The installation, pushout and torque-out values reported are averages when all installation specifications and procedures are followed. Variations in mounting hole size, sheet material and installation procedure will affect this data. These torques will ensure that induced preload will not exceed shear strength of knurled collar. Performance testing of this product in your application is recommended. We will be happy to provide samples for this purpose.

(4) These torques consider nut strength only. User must consider screw strength also. When type U/UL is installed in sheets thicker than .025" / 0.64 mm, tightening torque must be controlled so that induced preload does not exceed these values.

(5) The maximum locking torque and the minimum breakaway will fall within these values for five cycles when tested in accordance with the locking torque test procedure specified in NASM25027.

# MINIATURE SELF-CLINCHING FASTENERS

## PERFORMANCE DATA FOR TYPES FE, FEO, FEX, AND FEOX<sup>(1)(2)</sup>

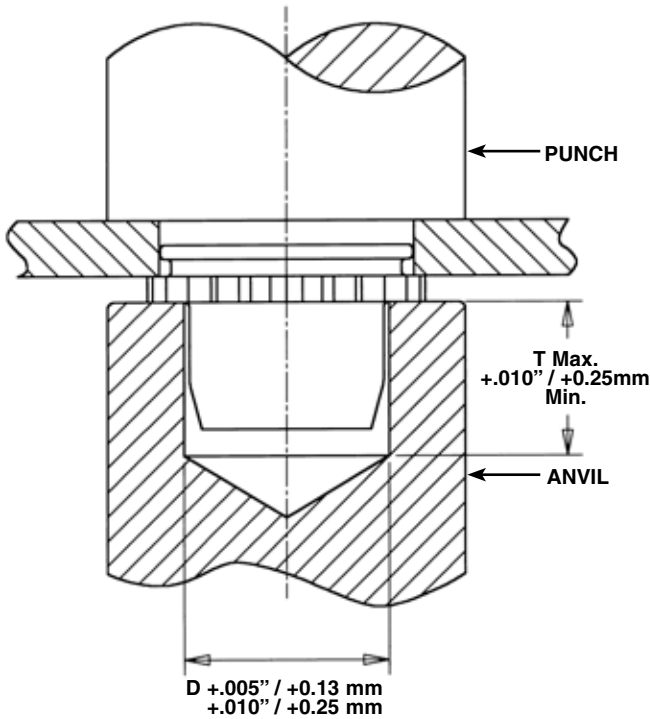
UNIFIED	Type	Thread Code	Max. Rec. Tightening Torque (in. lbs.) (3)	Test Sheet Material					
				5052-H34 Aluminum			Cold-rolled Steel		
				Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
FEO, FEOX	440	6.3	900	88	12	1500	140	12	
		10		135	12		210	12	
FEO, FEOX	632	10	1200	105	20	2100	185	20	
		15	1300	175			255		
FEO, FEOX	832	16	1500	155	48	2500	260	48	
		25		255			360		
FEO, FEOX	032	19	1500	155	48	2500	260	48	
		30		255			360		
FE, FEX	0420	45	2100	320	110	3500	420	110	
	0428								

METRIC	Type	Thread Code	Max. Rec. Tightening Torque (N•m) (3)	Test Sheet Material					
				5052-H34 Aluminum			Cold-rolled Steel		
				Installation (kN)	Pushout (N)	Torque-out (N•m)	Installation (kN)	Pushout (N)	Torque-out (N•m)
FEO, FEOX	M3	.76	4	391	1.35	6.7	622	1.35	
		1.13		600			934		
FEO, FEOX	M4	1.8	6.7	689	5.42	11.1	1156	5.42	
		2.8		1134			1601		
FEO, FEOX	M5	2.2	6.7	689	5.42	11.1	1156	5.42	
		3.5		1134			1601		
FE, FEX	M6	4.8	9.4	1423	12.43	15.6	1868	12.43	

- (1) The values above are representative of pushout and torque-out resistance between the shank of the fastener and the sheet. The installation, pushout and torque-out values reported are averages when all installation specifications and procedures are followed. Variations in mounting hole size, sheet material and installation procedure will affect this data. Performance testing of this product in your application is recommended. We will be happy to provide samples for this purpose.
- (2) For Types FE and FEO fasteners, thread locking performance is equivalent to applicable NASM25027 specifications. Consult technical sheet PEM-REF/NASM25027 on our web site for details.
- (3) These torques will ensure that induced preload will not exceed shear strength of knurled collar. These torques consider nut strength only. User must consider screw strength also. When type FE/FEX is installed in sheets thicker than .070" / 1.78 mm or when type FEO/FEOX is installed in sheets thicker than .045" / 1.14 mm, tightening torque must be controlled so that induced preload does not exceed these values.

# MINIATURE SELF-CLINCHING FASTENERS

## INSTALLATION



**PEM miniature fasteners must be installed by a force applied through parallel surfaces. Since force must not be applied to the barrel, a cavity must be used in either the punch or anvil so that the installation force is applied to the knurled collar. "D" dimensions for the punch or anvil cavity are given in the tables on page FE-3.**

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert fastener into the anvil hole and place the mounting hole (preferably the punch side) over the shank of the fastener as shown in the drawing.
3. With punch and anvil surfaces parallel, apply squeezing force until knurled collar is flush with top of the sheet for sheets .060" / 1.5 mm thick and up, or until shank is flush with the bottom of the sheet for sheets .040" / 1 mm to .060" / 1.5 mm thick for type FE/FEO.

*In applications for sheet thicknesses between the two ranges (see "Sheet Thickness" on page FE-3) use the fastener with the larger "A" dimension. For example, if you want a #4-40 thread and your sheet thickness is between .045" / 1.14 mm and .059" / 1.49 mm, you should use type FE or FEX. This is not recommended installation practice, but in this case if it is necessary, you should install the fastener so that the bottom of the shank is flush with the underside of the sheet (instead of having the top of the knurled collar flush with the top of the sheet). When this method is used, care must be taken to protect the fastener against crushing which would damage the threads. This method will also result in reduced pushout and torque-out values.*

### PEMSERTER® PRESSES

For best results we recommend using a PEMSERTER® press for installation of PEM Type FE and FEX fasteners. For more information on our line of presses call 1-800-523-5321 or check our web site.

RoHS compliance information can be found on our website.  
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