

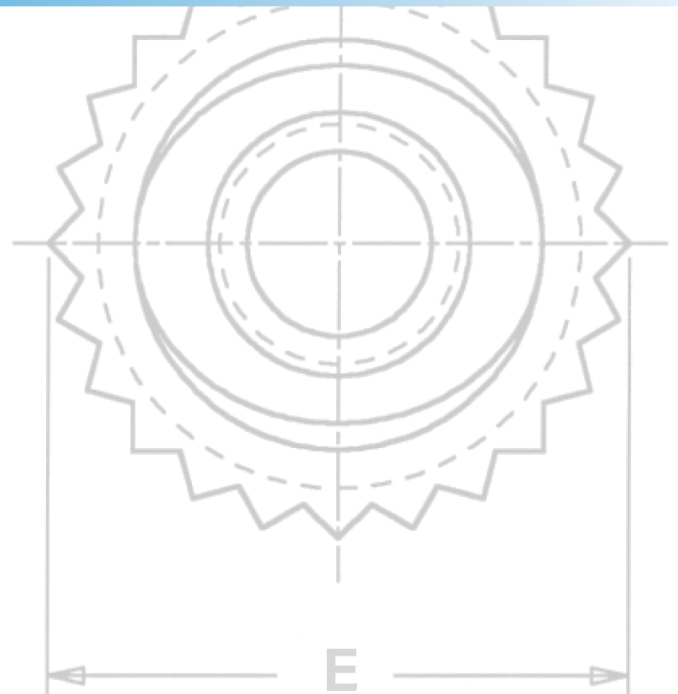


PEM® brand miniature fasteners fit into a minimal space and provide strong, reusable threads.



FE™

MINIATURE SELF-CLINCHING FASTENERS

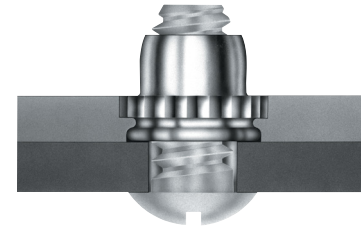


MINIATURE SELF-CLINCHING FASTENERS

PEM® brand miniature fasteners fit into a minimal space and provide strong, reusable threads.

PEM miniature fasteners provide visual indication when proper installation has been accomplished.

A strong, knurled collar, which is embedded in the sheet, guarantees against rotation of the fastener in the sheet. The torque-out resistance of the knurl greatly exceeds the torque that can be exerted by the self-locking feature.



When this collar is embedded in the sheet, the undercut cavity beneath the collar is filled with displaced sheet material thereby developing pushout resistance.

FE™/FEO™/UL™ prevailing torque locknuts provide ideal solutions to prevent mating hardware from loosening in service due to vibration or other application-related factors. A design feature of the lock nut produces friction between threads of mated components thereby increasing the force needed to tighten as well as loosen the nut. Prevailing torque locknuts provide essentially the same torque value regardless of the amount of axial load applied. Their use can save time and money compared with alternative chemical locking methods or patches.

A dry-film lubricant applied to locking FE™/FEO™/UL™ nuts provides the smooth, non-galling prevailing torque performance necessary for reliable locking and for reusability.⁽¹⁾ Screws for use with PEM self-clinching locking fasteners should be Class 3A/4h fit or no smaller than Class 2A/6g.

<p>FE™/FEO™/UL™ elliptically squeezed nuts are self-locking. FE/FEO nut thread locking torque performance is equivalent to applicable NASM25027 specifications. UL self-locking nuts meet locking torque requirements specified herein. Some sizes of FE/FEO/UL nuts can be ordered to NASM45938/7 specifications ⁽²⁾. For more information on NASM25027 as applied to PEM self-clinching, self-locking nuts, check our web site for tech sheet PEM® - Ref/NASM25027.</p>	
<p>FEX™/FEOX™/U™ non-locking nuts have class 2B/6H strong reusable threads. These fasteners can be installed into thinner sheets and closer to the edge of a sheet than standard self-clinching nuts. Some sizes of FEX/FEOX/U nuts can be ordered to NASM45938/7 specifications ⁽²⁾.</p>	

(1) Consult Bulletin LN for complete line of self-clinching, locking fasteners.

(2) To meet national aerospace standards and to obtain testing documentation, product must be ordered using appropriate NASM45938/7 part number. Check our web site for a complete Military Specification and National Aerospace Standards Reference Guide (Bulletin NASM).

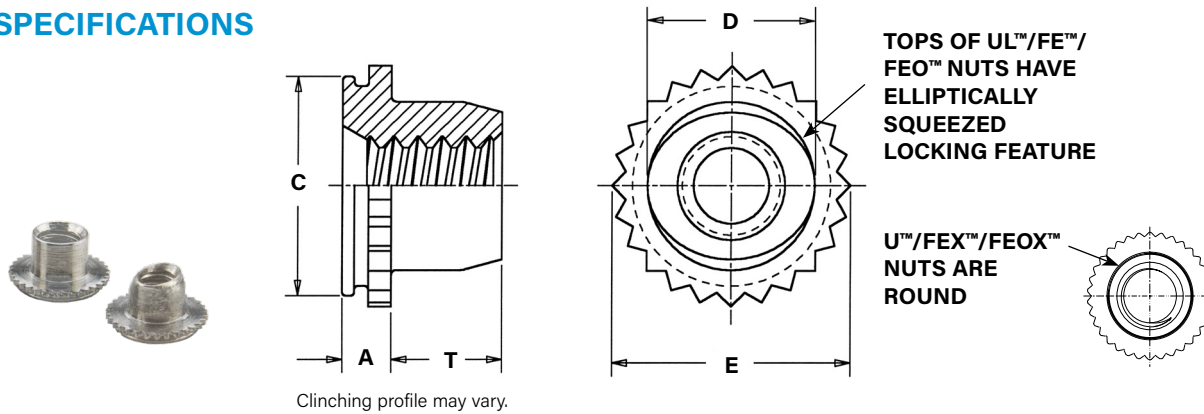
PART NUMBER DESIGNATION

U	-	080	-	0	
UL	-	080	-	0	CW
FE	-	440	-		MD
FEX	-	440			
FEO	-	440	-		MD
FEOX	-	440			
↓		↓		↓	↓
Type		Thread Code		Shank Code	Finish Code



MINIATURE SELF-CLINCHING FASTENERS

SPECIFICATIONS



Clinching profile may vary.

All dimensions are in inches.

	Thread Size	Type		Thread Code	Shank Code (2)	A (Shank) Max.	Sheet Thickness (3)	Hole Size In Sheet +.003 -0.00	C +.000 -0.005	D Max.	E ±.005	T +.015 -0.00	Min. Dist. Hole C/L to Edge (5)	Max. Hole In Attached Parts
		Non-locking(1)	Self-locking											
UNIFIED	.060-80 (#0-80)	U	UL	080	0	.020	.019-.022	.110	.1095	.076	.125	.050	.09	.080
	.073-64 (#1-64)	U	UL	164	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
					FEX	FE	.060							
	.138-32 (#6-32)	FEOX	FEO	632		.040	.039-.045	.213	.212	.180	.244	.075	.17	.158
					FEX	FE	.060							
	.164-32 (#8-32)	FEOX	FEO	832		.040	.039-.045	.290	.289	.215	.322	.090	.20	.184
					FEX	FE	.060							
	.190-32 (#10-32)	FEOX	FEO	032		.040	.039-.045	.290	.289	.245	.322	.110	.20	.210
					FEX	FE	.060							
	1/4-20	FEX	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 C/L to Edge (5)	Max. Hole In Attached Parts
		Non-locking(4)	Self-locking											
METRIC	M2 x 0.4	U	UL	M2	1	0.79	0.76-0.91	3.61	3.6	2.5	4.07	1.65	2.8	2.5
		FEOX	FEO			1.02	0.99-1.14							
	M3 x 0.5	FEX	FE	M3		1.53	1.5-1.78	4.39	4.37	3.96	4.88	1.9	3.6	3.5
		FEOX	FEO		1.02	0.99-1.14								
	M4 x 0.7	FEX	FE	M4		1.53	1.5-1.78	7.39	7.37	5.23	8.17	2.55	5.2	4.5
		FEOX	FEO		1.02	0.99-1.14								
M5 x 0.8	FEX	FE	M5		1.53	1.5-1.78	7.39	7.37	6.48	8.17	3.05	5.2	5.5	
	FEOX	FEO		1.02	0.99-1.14									
M6 x 1	FEX	FE	M6		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 U and UL fasteners.
- (3) In applications between the sheet thicknesses for your thread size, see last paragraph of installation data on page 4. 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 Go Gauge may stop at barrel end but class 4h screw will pass thru with finger torque.
- (5) For more information on proximity to bends and distance to other clinch hardware, see [PEM® Tech Sheet C/L To Edge](#).



MINIATURE SELF-CLINCHING FASTENERS

MATERIAL AND FINISH SPECIFICATIONS

Type	Threads		Fastener Material	Standard Finishes			For Use In Sheet Hardness ⁽¹⁾	Locking Temperature Limit	Self-locking	Covered by M45938/7 ⁽²⁾
	Internal, ASME B1.1, 2B / ASME B1.13M, 6H	Internal, UNJ Class 3B per ASME B1.15 / MJ Class 4H6H per ASME B1.21M (M6 thread 4H5H)		300 Series Stainless Steel	Passivated and/or Tested Per ASTM A380	Passivated Plus Clear Dry-film Lubricant				
U	▪		▪	▪			▪		▪	
UL		▪	▪		▪		▪	400° F / 204° C	▪	▪
FE		▪	▪	▪		▪	▪	400° F / 204° C	▪	▪
FEX	▪		▪	▪			▪			▪
FEO		▪	▪	▪		▪	▪	400° F / 204° C	▪	▪
FEOX	▪		▪	▪			▪			▪
Part number codes for finishes				None	CW ⁽³⁾	MD ⁽⁴⁾				

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

(2) To meet national aerospace standards and to obtain testing documentation, product must be ordered using appropriate NASM45938 part number. Check our web site for a complete Military Specification and National Aerospace Standards Reference Guide (Bulletin NASM).

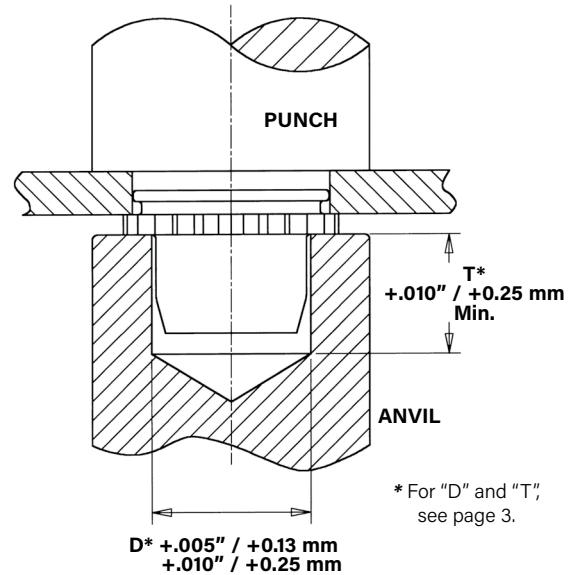
(3) See PEM Technical Support section of our web site for related plating standards and specifications.

(4) MD finish on stainless steel provides a minimum of 100 hours of salt spray resistance.

INSTALLATION

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.
3. With installation punch and anvil surfaces parallel, apply squeezing force to the knurled collar until knurled collar is flush with top of the sheet for sheets .060"/1.5mm thick and up, or until shank is flush with the bottom of the sheet for sheets .040"/1mm to .060"/1.5mm thick for FE/FEO nuts.

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 3.



Installation Tooling - U, UL, FE, FEO, FEX and FEOX Nuts

Type	Thread Code	HAEGER® Part Number		PEMSERTER® Part Number	
		Anvil	Punch	Anvil	Punch
U/UL	080	H-133-0L	H-108-0019L	8008451	975200048
U/UL	164	H-133-1L	H-108-0019L	970200300300	975200048
U/UL	256/M2	H-133-2L	H-108-0019L	975200020	975200048
FE/FEO/FEX/FEOX	440/M3	H-133-4L	H-108-0019L	975200021	975200048
FE/FEO/FEX/FEOX	632	H-133-6L	H-108-0019L	975200022	975200048
FE/FEO/FEX/FEOX	832/M4	H-133-8L	H-108-0019L	975200023	975200048
FE/FEO/FEX/FEOX	032/M5	H-133-10L	H-108-0019L	975200024	975200048
FE/FEO/FEX/FEOX	0420	H-133-04L	H-108-0019L	975200025	975200048
FE/FEO/FEX/FEOX	M6	—	—	8013143	975200048

Installation Notes

- For best results we recommend using a HAEGER® or PEMSERTER® machine for installation of PEM® self-clinching fasteners. See our [website](#) for more information.
- Visit the [Animation Library](#) on our website to view the installation process.

MINIATURE SELF-CLINCHING FASTENERS

INSTALLATION RECOMMENDATION

In applications for sheet thicknesses between the two ranges (see "Sheet Thickness" on page 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 FE or FEX nuts. 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.

For Additional HAEGER® and PEMSERTER® Tooling Information / Part Numbers

The diagram illustrates the digital tooling resources available. On the left is a red Haeger 824 manual tooling machine. In the center, a laptop displays the Haeger website with a circular callout showing a navigation menu: Tooling > Request > Auto Tooling Wizard, Manual Tooling Wizard, Force Chart, BTM Tooling, and Manual Tooling Catalog. Below the laptop, text reads: "Go to haeger.com to access the Auto and Manual Tooling Wizards". To the right is a blue Pemsarter manual tooling machine. Below the laptop, a smartphone displays the Haeger Wizzard app interface with a circular callout showing the menu: Tooling Wizard, BTM Tooling, Force Chart, Machine Selection, Machine Specification, Request RMA, and myHaeger. Text next to the phone says: "Or download the HAEGER WIZZARD Phone App".

HAEGER® MANUAL TOOLING CATALOG

HAEGER® AUTO TOOLING CATALOG

PEMSERTER® MANUAL TOOLING CATALOG

PEMSERTER® AUTO TOOLING CATALOG

OneTouch 4e XYZ-R

Tooling Wizard

BTM Tooling



MINIATURE SELF-CLINCHING FASTENERS

PERFORMANCE DATA FOR U™/UL™ FASTENERS(1)

UNIFIED	Type	Thread Code	Shank Code	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		750	20	2	1000	30	2
	164	0		750	20	3	1000	30	3
	256	0		1000	20	4	1300	30	4
1									

METRIC	Type	Thread Code	Shank Code	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		4	89	0.45	5.8	133	0.45

PERFORMANCE DATA FOR FE™/FEO™/FEX™/FEOX™ FASTENERS(1)(2)

UNIFIED	Type	Thread Code	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	FE/FEX	440	900	88	12	1500	140	12
				135			210	
FEO/FEOX	FE/FEX	632	1200	105	20	2100	185	20
				1300			175	
FEO/FEOX	FE/FEX	832	1500	155	48	2500	260	48
				255			360	
FEO/FEOX	FE/FEX	032	1500	155	48	2500	260	48
				255			360	
FE/FEX	0420	0428	2100	320	110	3500	420	110

METRIC	Type	Thread Code	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	FE/FEX	M3	4	391	1.35	6.7	622	1.35
				600			934	
FEO/FEOX	FE/FEX	M4	6.7	689	5.42	11.1	1156	5.42
				1134			1601	
FEO/FEOX	FE/FEX	M5	6.7	689	5.42	11.1	1156	5.42
				1134			1601	
FE/FEX	M6		9.4	1423	12.43	15.6	1868	12.43

(1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.

(2) For 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.

AXIAL STRENGTH AND TIGHTENING TORQUE COMPARISON

UNIFIED	Thread Code	Increasing Axial Strength →					
		U-0/UL-0/FE0X/FE0 Nuts			U-1/UL-1/FE1/FE Nuts		
		Locknut Min. Axial Strength (lbs.) ⁽¹⁾	Mating Screw		Locknut Min. Axial Strength (lbs.) ⁽¹⁾	Mating Screw	
			Strength Level (ksi) ⁽²⁾	Tightening Torque (in. lbs.) ⁽³⁾		Strength Level (ksi) ⁽²⁾	Tightening Torque (in. lbs.) ⁽³⁾
080	125	69	1.0	—	—	—	
164	125	49	1.2	—	—	—	
256	169	46	1.9	316	85	3.5	
440	465	77	6.8	705	117	10.3	
632	546	60	9.8	847	93	15.2	
832	779	56	16.6	1,213	87	25.9	
032	779	39	19.2	1,213	61	30.0	
0420	—	—	—	1,412	44	45.9	

METRIC	Thread Code	Increasing Axial Strength →					
		U-0/UL-0/FE0X/FE0 Nuts			U-1/UL-1/FE1/FE Nuts		
		Locknut Min. Axial Strength (kN) ⁽¹⁾	Mating Screw		Locknut Min. Axial Strength (kN) ⁽¹⁾	Mating Screw	
			Strength Level (MPa) ⁽²⁾	Tightening Torque (N-m) ⁽³⁾		Strength Level (MPa) ⁽²⁾	Tightening Torque (N-m) ⁽³⁾
M2	—	—	—	1.39	432	0.36	
M3	2.08	267	0.81	3.16	405	1.23	
M4	3.48	255	1.81	5.42	398	2.82	
M5	3.48	158	2.26	5.42	246	3.52	
M6	—	—	—	6.28	201	4.9	

(1) Axial strength for nuts is limited by knurled ring strength.

(2) Screw strength level shown is the minimum needed to develop full nut strength, higher strength screws may be used.

(3) Tightening torque shown will induce preload of 65% of locknut minimum axial strength with K or nut factor is equal to 0.20. In some applications tightening torque may need to be adjusted based on the actual K value. If screw strength is less than the value shown, tightening torque should be proportionately reduced by multiplying the torque shown by the actual screw strength over the screw strength shown. If higher strength screws are used, torque is not adjusted upward because assemble strength is still limited by locknut strength.



Drawings and models
are available at
www.pemnet.com

All PEM® products meet our stringent quality standards. If you require additional industry or other specific [quality certifications](#), special procedures and/or part numbers are required. Please contact your local sales office or representative for further information.

Regulatory [compliance information](#) is available in Technical Support section of our website. Specifications subject to change without notice. See our website for the most current version of this bulletin.

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