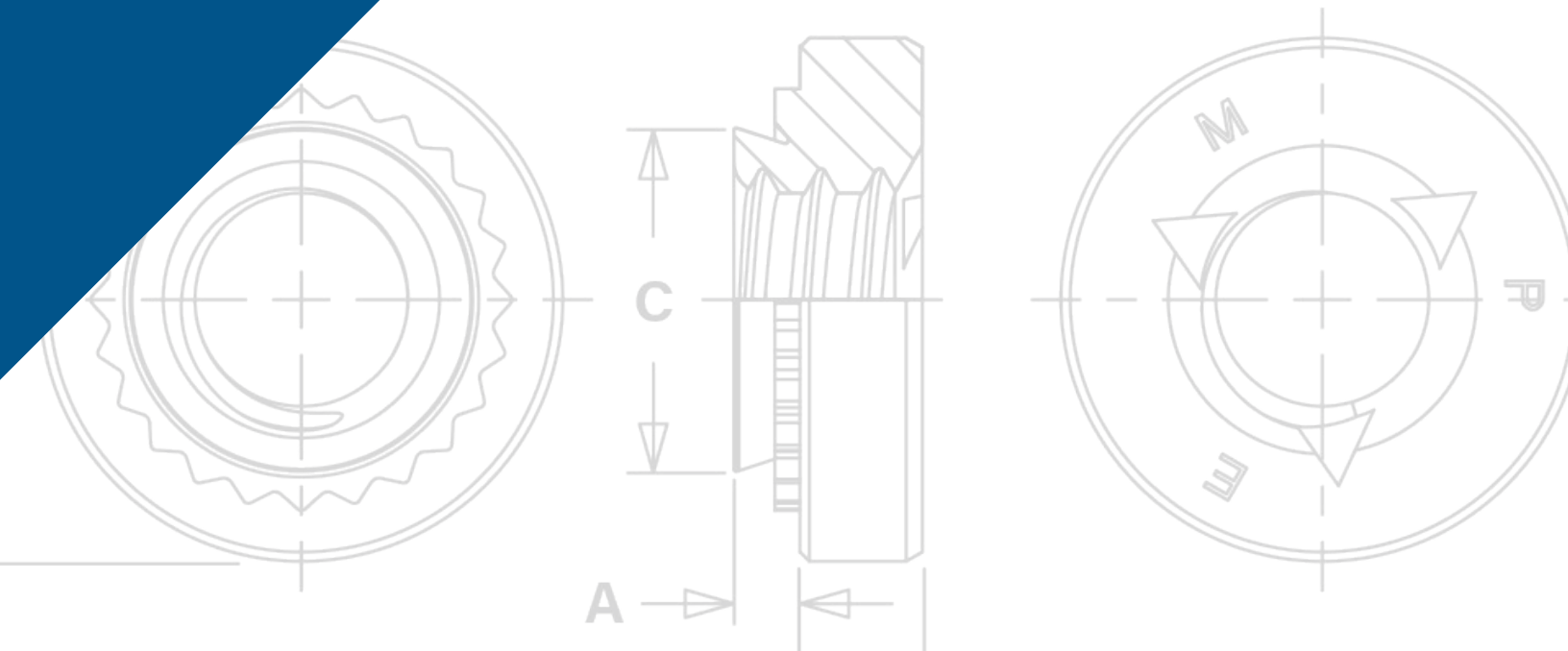
Bulletin LN-218
Rev 919

PEM® self-clinching locknuts prevent mating hardware from loosening.

LN™

SELF-LOCKING FASTENERS



PEM® SELF-CLINCHING LOCKNUTS PREVENT MATING HARDWARE FROM LOOSENING

PEM® self-clinching locknuts provide ideal solutions to prevent mating hardware from loosening in service due to vibration or other application-related factors. This family of fasteners includes a variety of types and different locking-feature styles to satisfy a wide range of applications. Their use can save time and money compared with alternative chemical locking methods or patches.

ABOUT LOCKING THREADS

PEM® locknuts include two locking designs:

1) **PREVAILING TORQUE** (CFN™, FE™, FEO™, UL™, LAS™, LAC™, LA4™, LK™, LKS™, LKA™, PL™, PLC™ and SL™ locknuts) – 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.

   Available in two types:

   - **All metal –**
     All PEM metal prevailing torque type locknuts achieve their prevailing torque by altering the shape of the nut in some way - most commonly by distorting the threads of the nut, which then grips the mating part during tightening. Screws for use with PEM prevailing torque locknuts should be Class 3A/4h fit or no smaller than Class 2A/6g.

     Available in three styles:
     - **Elliptically squeezed threads** (UL™, FE™, FEO™, LAC™, LAS™ and LA4™ locknuts) – the thread barrel is slightly deformed into an elliptical shape.
     - **Flexing jaws** (LK™, LKS™ and LKA™ locknuts) - the thread barrel is vertically slit and then the two sections are squeezed together.
     - **One or two deformed threads** (SL™ locknuts) - the last threads on the head side of the nut are deformed.

     Typically prevailing torque locknuts utilizing a metal locking feature are treated with a dry film lubricant coating to afford some level of lubricity to reduce damage to the threads from repeated installation and removal of the screw and reduce required tightening torque. Care should be taken to be sure that lubricant is not removed in any post installed finishing operations.

   - **Nylon insert**
     The PL™, PLC™ and CFN™ locknuts use a plastic insert, typically made from nylon to generate the torque resistance. A nylon ring is attached to the self-clinching body on the screw exit side with an ID approximately at the screw pitch diameter. As the screw enters this ring, there is interference at the major diameter generating a prevailing torque. The major advantage of this locking method is the greatly reduced chance of any conductive debris being generated by repeated installation and removal of the screw.

2) **FREE-RUNNING** (PEM RT® locknuts) – a nut that requires tightening against a bearing surface in order for the locking mechanism to function. If the tightening force (clamp load) is removed for any reason, these nuts no longer provide any torsional resistance to rotation. The **modified thread formation** allows mating screws to spin freely during the attachment process until clamp load is induced during the screw-tightening process.

PEM free-running locknuts will accept a maximum material 6g/2A screw.

Fastener drawings and models are available at www.pemnet.com

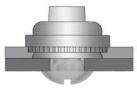
CFN™ broaching fasteners are available for thinner sheet, close-to-edge applications. The nylon locking element provides prevailing torque to eliminate loosening of mating threaded hardware - **PAGE 4**

Nylon Insert

FE™/FEO™/UL™ miniature locking nuts, provide a smaller body for tight space, lightweight applications - **PAGE 5**

Elliptically Squeezed Threads

LAS™/LAC™/LA4™ nuts with self-locking, floating threads that permit up to .030"/0.76 mm adjustment for mating hole misalignment - **PAGE 6**



Elliptically Squeezed Threads

LK™/LKS™/LKA™ nuts have a rugged PEMFLEX® self-locking feature which meets demanding locking performance requirements - **PAGE 7**

Flexing Jaws

PL™/PLC™ PEMHEX® nuts with a nylon hexagonal element provide a locking option for applications where a metal on metal locking feature is not desired - **PAGE 8**

Nylon Insert

SL™ locknuts offer a cost effective TRI-DENT® locking feature and effective prevailing locking torque - **PAGE 9**

Deformed Threads

PEM RT® locknuts are free-running until clamp load is induced. A modified thread angle on the loaded flank provides the vibration resistant locking feature- **PAGE 10**

NEW

Free-running Threads

Material and finish specifications - PAGES 11

Installation - PAGES 12 - 15

Performance data - PAGES 16 - 20

LOCKING NUT SELECTOR GUIDE

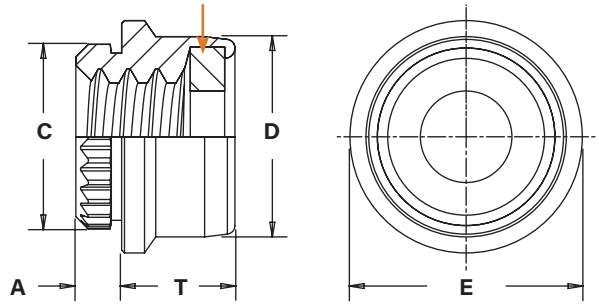
PEM Locking Nut	Page No.	Locking Performance Cycles	Application Features				Locking Performance Temperature Limit	Non-metal on Metal Locking Feature	Locking Style	Covered by (1)	
			High Clamp Strength	Floating Threads	Light Weight	Close-to-edge Applications				M45938/7	M45938/11
CFN	4	1	▪			▪	(6)	▪	Nylon Insert		
FE	5	15(3)			▪	▪	(7)		Elliptically Squeezed	▪	
FEO	5	15(3)			▪	▪	(7)		Elliptically Squeezed	▪	
UL	5	5(4)			▪	▪	(7)		Elliptically Squeezed	▪	
LAS	6	15(3)	▪	▪			(7)		Elliptically Squeezed		▪
LAC	6	15(3)	▪	▪			(7)		Elliptically Squeezed		▪
LA4(2)	6	15(3)	▪	▪			(7)		Elliptically Squeezed		▪
LK	7	15(3)	▪				(7)		Flexing Jaws		
LKS	7	15(3)	▪				(7)		Flexing Jaws		
LKA	7	15(3)	▪				(9)		Flexing Jaws		
PL	8	15(3)					(6)	▪	Nylon Insert		
PLC	8	15(3)					(6)	▪	Nylon Insert		
SL	9	3	▪				(8)		Deformed Threads		
PEM RT®	10	(5)	▪				(8)		Free-running Threads		

(1) 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).
(2) Specifically designed to be installed into stainless steel sheets.
(3) See page 19 for information on NASM25027 as applied to PEM self-clinching, self-locking nuts.
(4) Meets torque requirements for NASM25027 through five cycles.
(5) Locking performance is not affected by the number of on/off cycles.
(6) Nylon locking element temperature limit is 250˚ F / 120˚ C.
(7) Dry film lubricant rated for use up to 400˚ F / 204˚ C.
(8) The fastening strength of the locknut is maintained up to 800˚ F / 426˚ C. Temperatures above 300˚ F / 149˚ C will dehydrate the conversion coating.
(9) Aluminum material temperature limit is 250˚ F / 120˚ C.

CFN™ BROACHING LOCKNUT

- For thinner sheets, close-to-edge applications.
- Prevailing torque locking element provides torque to eliminate loosening of mating threaded hardware.

Nylon locking element
(Blue identifier* for unified fasteners / black identifies metric fasteners)



Clinching profile may vary.

PART NUMBER DESIGNATION

CFN - 440 - 1 ZI

CFN	440	1	ZI
Type	Thread Code	Shank Code	Finish Code

All dimensions are in inches.

	Thread Size	Type	Thread Code	Shank Code	A (Shank) ±.003	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C ±.002	D ±.004	E +.001 -.004	T Max.	Min. Dist. Hole ℄ to Edge
UNIFIED	.112-40 (#4-40)	CFN	440	1	.040	.043	.152	.162	.175	.203	.104	.115

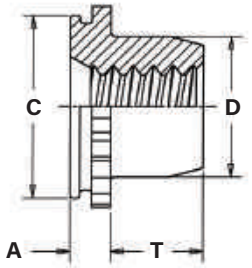
All dimensions are in millimeters.

	Thread Size x Pitch	Type	Thread Code	Shank Code	A (Shank) ±0.08	Min. Sheet Thickness	Hole Size In Sheet +0.08	C ±0.05	D ±0.1	E +0.03 -0.1	T Max.	Min. Dist. Hole ℄ to Edge
METRIC	M3 x 0.5	CFN	M3	1	1.02	1.1	3.86	4.11	4.45	5.16	2.65	2.93

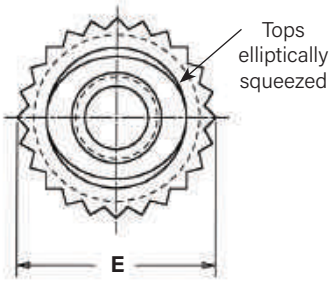
** PEM Trademark.*

FE™/FEO™/UL™ LOCKNUTS

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



Clinching profile may vary.



PART NUMBER DESIGNATION

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

All dimensions are in inches.

	Thread Size	Type	Thread Code	Shank Code (1)	A (Shank) Max.	Sheet Thickness (2)	Hole Size In Sheet +.003 -.000	C +.000 -.005	D Max.	E ±.005	T +.015 -.000	Min. Dist. Hole ℄ to Edge	Max. Hole In Attached Parts
UNIFIED	.060-80 (#0-80)	UL	080	0	.020	.019 - .022	.110	.1095	.076	.125	.050	.09	.080
	.073-64 (#1-64)	UL	164	0	.020	.019 - .022	.110	.1095	.090	.125	.050	.09	.093
	.086-56 (#2-56)	UL	256	0	.020	.019 - .022	.144	.1435	.106	.160	.065	.11	.106
				1	.031	.030 - .036							
	.112-40 (#4-40)	FEO	440		.040	.039 - .045	.172	.171	.145	.192	.065	.14	.132
		FE			.060	.059 - .070							
	.138-32 (#6-32)	FEO	632		.040	.039 - .045	.213	.212	.180	.244	.075	.17	.158
		FE			.060	.059 - .070							
	.164-32 (#8-32)	FEO	832		.040	.039 - .045	.290	.289	.215	.322	.090	.20	.184
		FE			.060	.059 - .070							
	.190-32 (#10-32)	FEO	032		.040	.039 - .045	.290	.289	.245	.322	.110	.20	.210
		FE			.060	.059 - .070							
	1/4-20	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 (1)	A (Shank) Max.	Sheet Thickness (2)	Hole Size In Sheet +0.08	C -0.13	D Max.	E ±0.13	T +0.4	Min. Dist. Hole ℄ to Edge	Max. Hole In Attached Parts
METRIC	M2 x 0.4	UL	M2	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	FEO	M3		1.02	0.99 - 1.14	4.39	4.37	3.96	4.88	1.9	3.6	3.5
		FE			1.53	1.5 - 1.78							
	M4 x 0.7	FEO	M4		1.02	0.99 - 1.14	7.39	7.37	5.23	8.17	2.55	5.2	4.5
		FE			1.53	1.5 - 1.78							
	M5 x 0.8	FEO	M5		1.02	0.99 - 1.14	7.39	7.37	6.48	8.17	3.05	5.2	5.5
		FE			1.53	1.5 - 1.78							
	M6 x 1	FE	M6		1.53	1.5 - 1.78	8.74	8.72	7.72	9.74	3.3	7.1	6.5

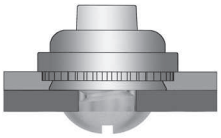
(1) Shank code applicable only to UL fasteners.

(2) In applications between the sheet thicknesses for your thread size, see last paragraph of installation data on page 11. Knurled collar may fracture if fastener is used in sheets thicker than the specified range and the screw is tightened beyond maximum tightening torque.

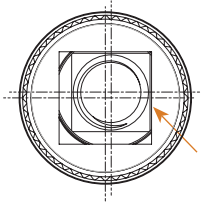
LAS™/LAC™/LA4™ LOCKNUTS

- Provide load-bearing threads in thin sheets and permit a minimum of .030"/0.76 mm adjustment for mating hole misalignment.
- Extra strength and support in assembly is obtained by the threads of the floating nut extending into the retainer shank.
- Thread locking torque performance is equivalent to applicable NASM25027 specifications.
- LA4 floating fasteners are specifically designed to be installed into stainless steel sheets.

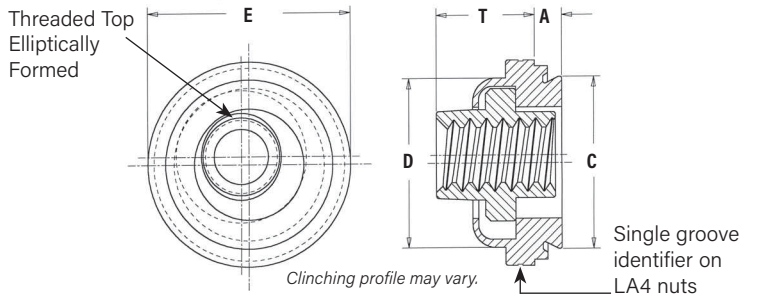
To meet national aerospace standards and to obtain testing documentation, product must be ordered to US NASM45938/11 specifications. Check our web site for a complete Military Specification and National Aerospace Standards Reference Guide (Bulletin NASM)



PEM® Double Squares are a registered trademark.



***Float –** .015"/0.38 mm minimum, in all directions from center, .030"/0.76 mm total.*



All dimensions are in inches.

	Thread Size	Type: Fastener Material: Steel	Type: Fastener Material: 300 Series Stainless	Type: Fastener Material: 400 Series Stainless	Thread Code	Shank Code	A (shank) Max.	Min. Sheet Thickness	Hole Size in Sheet +.003 -.000	C Max.	D Max.	E ±.015	T_2 Max.	Min. Dist. Hole ℄ to Edge
UNIFIED	.112-40 (#4-40)	LAS	LAC	LA4	440	1	.038	.038	.290	.289	.290	.360	.190	.30
						2 (1)	.054	.054						
	.138-32 (#6-32)	LAS	LAC	LA4	632	1	.038	.038	.328	.327	.335	.390	.200	.32
						2 (1)	.054	.054						
	.164-32 (#8-32)	LAS	LAC	LA4	832	1	.038	.038	.368	.367	.365	.440	.210	.34
						2 (1)	.054	.054						
	.190-24 (#10-24)	LAS	LAC	LA4	024	1	.038	.038	.406	.405	.405	.470	.270	.36
						2	.054	.054						
	.190-32 (#10-32)	LAS	LAC	LA4	032	1	.038	.038	.406	.405	.405	.470	.270	.36
						2 (1)	.054	.054						
	.250-20 (1/4-20)	LAS	LAC	–	0420	2	.054	.054	.515	.514	.510	.600	.310	.42
	.250-28 (1/4-28)	LAS	LAC	–	0428	2	.054	.054	.515	.514	.510	.600	.310	.42

All dimensions are in millimeters.

	Thread Size x Pitch	Type: Fastener Material: Steel	Type: Fastener Material: 300 Series Stainless	Type: Fastener Material: 400 Series Stainless	Thread Code	Shank Code	A (shank) Max.	Min. Sheet Thickness	Hole Size in Sheet +0.08	C Max.	D Max.	E ±0.38	T_2 Max.	Min. Dist. Hole ℄ to Edge
METRIC	M3 x 0.5	LAS	LAC	LA4	M3	1	0.97	0.97	7.37	7.35	7.37	9.14	4.83	7.62
						2 (1)	1.38	1.38						
	M4 x 0.7	LAS	LAC	LA4	M4	1	0.97	0.97	9.35	9.33	9.28	11.18	5.34	8.64
						2 (1)	1.38	1.38						
	M5 x 0.8	LAS	LAC	LA4	M5	1	0.97	0.97	10.31	10.29	10.29	11.94	6.86	9.14
						2 (1)	1.38	1.38						
	M6 x 1	LAS	LAC	–	M6	2	1.38	1.38	13.08	13.06	12.96	15.24	7.88	10.67

(1) This shank code is not available for LA4 nuts.

PART NUMBER DESIGNATION

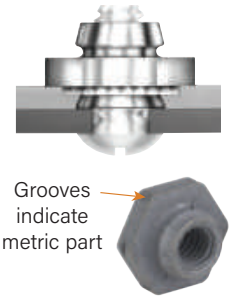
LA C - 440 - 1 MD
LA S - 440 - 1 MD
LA 4 - 440 - 1 MD

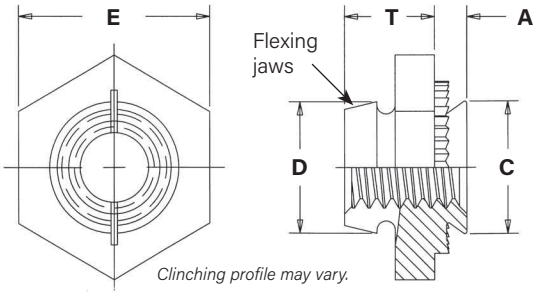
Type | Retainer Material Code | Thread Code | Shank Code | Finish Code

LK™/LKS™/LKA™ PEMFLEX® LOCKNUTS

The PEM design utilizes two rugged, semicircular flexing jaws instead of several less-supported segments. The greater ruggedness and retention of this PEMFLEX® action prevents relaxation and loosening of the fastener in severe service. This design also protects the screw threads. Clearances obtained by only two interruptions of a full circumference, together with the spreading of the jaws by the entering screw, minimize the possibility of thread damage.

- Hex shoulder provides increased pull-through performance and a positive stop during installation.
- The flexing action of locking feature permits repeated use and effective locking torque.
- Thread locking performance of LK and LKS fasteners (with MD finish) and LKA fasteners (lubricated) are equivalent to applicable NASM25027 specifications.





PART NUMBER DESIGNATION

LK		-	632	-	1	MD
LK	S	-	632	-	1	MD
LK	A	-	632	-	1	
↓ Type	↓ Fastener Material Code		↓ Thread Size Code		↓ Shank Code	↓ Finish Code

All dimensions are in inches.

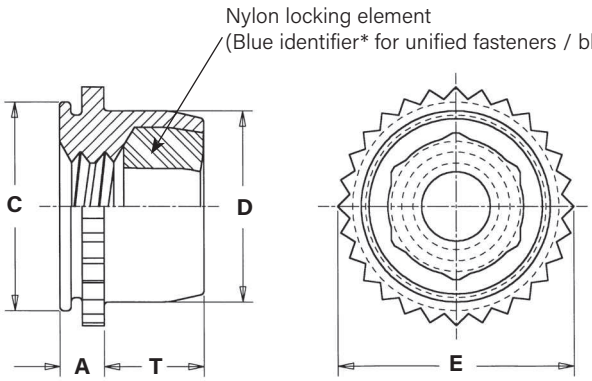
	Thread Size	Type: Fastener Material: Carbon Steel	Type: Fastener Material: Stainless Steel	Type: Fastener Material: Aluminum	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C Max.	D Max.	E Nom.	T ±.010	Min. Dist. Hole ℄ to Edge
UNIFIED	.086-56 (#2-56)	LK	LKS	LKA	256	1	.038	.040	.172	.171	.165	.250	.135	.156
						2	.054	.056						
	.112-40 (#4-40)	LK	LKS	LKA	440	1	.038	.040	.187	.186	.185	.250	.135	.156
						2	.054	.056						
	.138-32 (#6-32)	LK	LKS	LKA	632	1	.038	.040	.219	.218	.220	.312	.145	.187
						2	.054	.056						
	.164-32 (#8-32)	LK	LKS	LKA	832	1	.038	.040	.266	.265	.250	.343	.175	.203
						2	.054	.056						
	.190-32 (#10-32)	LK	LKS	LKA	032	1	.038	.040	.312	.311	.285	.375	.205	.218
						2	.054	.056						

All dimensions are in millimeters.

	Thread Size x Pitch	Type: Fastener Material: Carbon Steel	Type: Fastener Material: Stainless Steel	Type: Fastener Material: Aluminum	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +0.08	C Max.	D Max.	E Nom.	T ±0.25	Min. Dist. Hole ℄ to Edge
METRIC	M2.5 X 0.45	LK	LKS	LKA	M2.5	1	0.97	1	4.37	4.35	4.45	6.35	3.43	3.9
						2	1.38	1.4						
	M3 X 0.5	LK	LKS	LKA	M3	1	0.97	1	4.75	4.73	4.85	6.35	3.43	4
						2	1.38	1.4						
	M4 X 0.7	LK	LKS	LKA	M4	1	0.97	1	6.76	6.73	6.2	8.73	4.45	5.2
						2	1.38	1.4						
	M5 X 0.8	LK	LKS	LKA	M5	1	0.97	1	7.92	7.9	7.4	9.53	5.21	5.6
						2	1.38	1.4						

PL™/PLC™ PEMHEX® LOCKNUTS

- Thread locking torque performance is equivalent to applicable NASM25027 specifications.
- The strong knurled collar receives the installation force and resists torque.
- The spin resistance of the knurl greatly exceeds the torque that can be exerted by the self-locking feature.



Clinching profile may vary.

PART NUMBER DESIGNATION

PL		-	440	- ZI
PL	C	-	440	
Type	Material Code		Thread Code	Finish Code

All dimensions are in inches.

	Thread Size	Type: Fastener Material: Steel	Type: Fastener Material: Stainless Steel	Thread Code	A (Shank) Max.	Sheet Thickness (1) (2)	Hole Size In Sheet +.003 -.000	C Max.	D Max.	E Max.	T Max.	Min. Dist. Hole ℄ to Edge	Max. Hole In Attached Parts
UNIFIED	.112-40 (#4-40)	PL	PLC	440	.060	.040 - .070	.234	.233	.215	.274	.130	.170	.132
	.138-32 (#6-32)	PL	PLC	632	.060	.040 - .070	.265	.264	.246	.305	.130	.190	.158
	.164-32 (#8-32)	PL	PLC	832	.060	.040 - .070	.297	.296	.278	.338	.155	.220	.184
	.190-32 (#10-32)	PL	PLC	032	.060	.040 - .070	.312	.311	.293	.353	.165	.250	.210

All dimensions are in millimeters.

	Thread Size x Pitch	Type: Fastener Material: Steel	Type: Fastener Material: Stainless Steel	Thread Code	A (Shank) Max.	Sheet Thickness (1) (2)	Hole Size In Sheet +0.08	C Max.	D Max.	E Max.	T Max.	Min. Dist. Hole ℄ to Edge	Max. Hole In Attached Parts
METRIC	M3 x 0.5	PL	PLC	M3	1.53	1 - 1.78	6	5.98	5.52	7.01	3.56	4.32	3.5
	M4 x 0.7	PL	PLC	M4	1.53	1 - 1.78	7.5	7.48	7.01	8.54	4.2	5.59	4.5
	M5 x 0.8	PL	PLC	M5	1.53	1 - 1.78	8	7.98	7.52	9	4.45	6.35	5.5

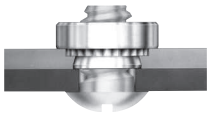
(1) Can be used in panel thickness of .040" to .060"/1 mm to 1.53 mm provided the fastener is not fully installed. The knurled collar must be left protruding above the sheet to the degree that the sheet thickness is less than .060"/1.53 mm. See installation instructions.

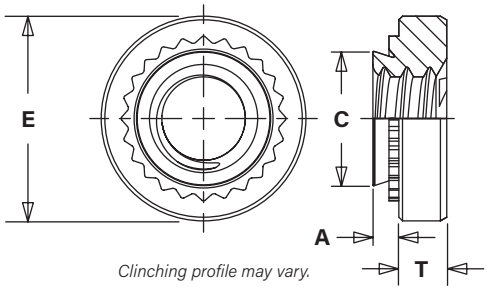
(2) Knurled collar may fracture if fastener is used in sheets thicker than .070"/1.78 mm and screw is tightened beyond maximum tightening torque.

** PEM Trademark.*

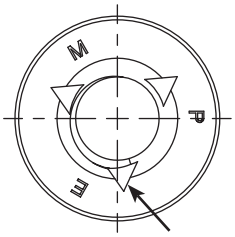
SL™ TRI-DENT® LOCKNUTS

- SL locknuts meet 3 cycle locking performance (1).
- Recommended for use in sheets HRB (Rockwell "B" scale) 80 or less and HB (Hardness Brinell) 150 or less.





Clinching profile may vary.



PEM TRI-DENT® Locking Feature.
Locking feature appearance may vary.

PART NUMBER DESIGNATION

SL	-	440	-	1	ZI
Type		Thread Code		Shank Code	Finish Code

All dimensions are in inches.

	Thread Size	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C Max.	E ±.010	T ±.010	Min. Dist. Hole ℄ to Edge
UNIFIED	.112-40 (#4-40)	SL	440	1	.038	.040	.166	.165	.250	.070	.19
				2	.054	.056					
	.138-32 (#6-32)	SL	632	1	.038	.040	.1875	.187	.280	.070	.22
				2	.054	.056					
	.164-32 (#8-32)	SL	832	1	.038	.040	.213	.212	.310	.090	.27
				2	.054	.056					
	.190-32 (#10-32)	SL	032	1	.038	.040	.250	.249	.340	.090	.28
				2	.054	.056					
	.250-20 (1/4-20)	SL	0420	1	.054	.056	.344	.343	.440	.170	.34
				2	.087	.091					
	.313-18 (5/16-18)	SL	0518	1	.054	.056	.413	.412	.500	.230	.38
				2	.087	.091					
	.375-16 (3/8-16)	SL	0616	1	.087	.090	.500	.499	.625	.270	.44
				2	.120	.125					

All dimensions are in millimeters.

	Thread Size x Pitch	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +0.08	C Max.	E ±0.25	T ±0.25	Min. Dist Hole ℄ to Edge
METRIC	M3 x 0.5	SL	M3	1	0.98	1	4.22	4.2	6.35	1.5	4.8
				2	1.38	1.4					
	M3.5 x 0.6	SL	M3.5	1	0.98	1	4.75	4.73	7.11	1.5	5.6
				2	1.38	1.4					
	M4 x 0.7	SL	M4	1	0.98	1	5.41	5.38	7.87	2	6.9
				2	1.38	1.4					
	M5 x 0.8	SL	M5	1	0.98	1	6.35	6.33	8.64	2	7.1
				2	1.38	1.4					
	M6 x 1	SL	M6	1	1.38	1.4	8.75	8.73	11.18	4.08	8.6
				2	2.21	2.3					
	M8 x 1.25	SL	M8	1	1.38	1.4	10.5	10.47	12.7	5.47	9.7
				2	2.21	2.3					
	M10 x 1.5	SL	M10	1	2.21	2.29	14	13.97	17.35	7.48	13.5
				2	3.05	3.18					

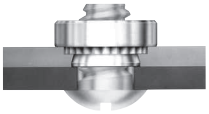
(1) Achieved using steel socket head cap screws, 180 ksi / property class 12.9 with standard finish of thermal oxide and light oil.

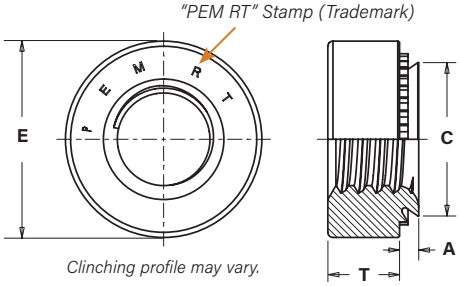
PEM RT® FREE-RUNNING LOCKNUTS

NEW

Free-running locking feature allows screw to turn freely until clamp load is applied. If the tightening force is removed, these nuts no longer provide any torsional resistance to rotation until clamp load is reapplied.

- Resistant to vibrational loosening.
- Back side of panel is flush or sub-flush for screw installation.
- Locking feature reusability is not affected by number of on/off cycles.
- Uses same mounting hole and installation tooling as standard S™ nuts.
- Recommended for use in steel or aluminum sheets HRB 80 / HB 150 or less.





PART NUMBER DESIGNATION

S - RT632 - 1 ZI

- S: Type
- RT632: Thread Size Code
- 1: Shank Code
- ZI: Finish

All dimensions are in inches.

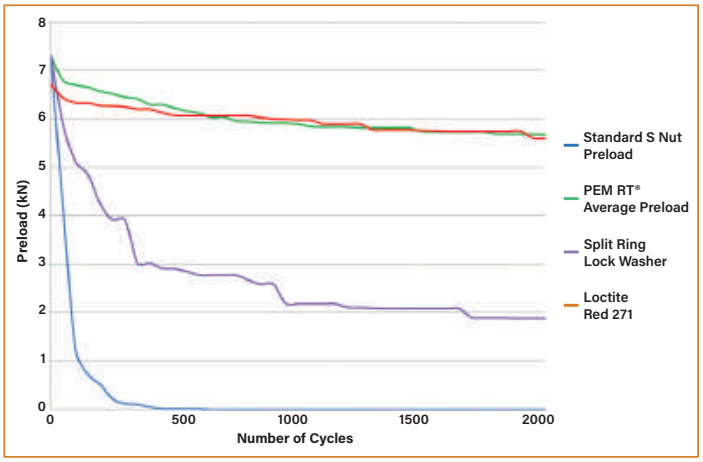
	Thread Size	Type	Thread Code	Shank Code	A (Shank) Max.	Rec. Min. Sheet Thickness (1)	Hole Size In Sheet +.003 -.000	C Max.	E ±.010	T ±.010	Min. Dist Hole ℄ To Edge
UNIFIED	.112-40 (#4-40)	S	RT440	0	.030	.030	.166	.165	.250	.070	.19
				1	.038	.040					
				2	.054	.056					
	.138-32 (#6-32)	S	RT632	0	.030	.030	.1875	.187	.280	.070	.22
				1	.038	.040					
				2	.054	.056					
	.164-32 (#8-32)	S	RT832	0	.030	.030	.213	.212	.310	.090	.27
				1	.038	.040					
				2	.054	.056					
	.190-32 (#10-32)	SS	RT032	0	.030	.030	.250	.249	.340	.090	.28
				1	.038	.040					
				2	.054	.056					
	.250-20 (1/4-20)	S	RT0420	0	.045	.047	.344	.343	.440	.170	.34
				1	.054	.056					
				2	.087	.090					
	.313-18 (5/16-18)	S	RT0518	1	.054	.056	.413	.412	.500	.230	.38
				2	.087	.090					

All dimensions are in millimeters

	Thread Size x Pitch	Type	Thread Code	Shank Code	A (Shank) Max.	Rec. Min. Sheet Thickness (1)	Hole Size In Sheet +0.08	C Max.	E ±0.25	T ±0.25	Min. Dist Hole ℄ To Edge
METRIC	M3 x 0.5	S	RTM3	0	0.77	0.8	4.22	4.2	6.35	1.5	4.8
				1	0.97	1					
				2	1.38	1.4					
	M4 x 0.7	S	RTM4	0	0.77	0.8	5.41	5.38	7.87	2	6.9
				1	0.97	1					
				2	1.38	1.4					
	M5 x 0.8	SS	RTM5	0	0.77	0.8	6.35	6.33	8.64	2	7.1
				1	0.97	1					
				2	1.38	1.4					
	M6 x 1	S	RTM6	00	0.89	0.92	8.75	8.73	11.18	4.08	8.6
				0	1.15	1.2					
				1	1.38	1.4					
				2	2.21	2.29					
	M8 x 1.25	S	RTM8	1	1.38	1.4	10.49	10.47	12.7	5.84	9.65
				2	2.21	2.29					

The graph represents the clamp load of the joint versus the amount of cycles during transverse vibration testing for a PEM RT® free-running locknut, a standard S nut, a split ring lock washer and Loctite Red 271.

Testing conditions:
Transverse vibration testing.
M6 thread size nuts, average of 30 pieces.
Clamp load applied using metric property class 10.9 screws.
Nuts tested until loss of clamp load or 2,000 cycles is reached.



Details on PEM RT® vibration resistant thread technology can be found on our web site at:
https://www.pemnet.com/files/design_info/techsheets/RT_Thread_Form.pdf

MATERIAL AND FINISH SPECIFICATIONS

	Threads				Fastener Material								
										Floating Fastener			
										Retainer	Retainer	Retainer	Nut
Type	Internal, ASME B1.1, 2B / ASME B1.13M, 6H	Internal, ASME B1.1, 3B / ASME B1.13M, 6H	Internal, UNJ Class 3B per ASME B1.15 / MJ Class 4H6H per ASME B1.21M (M6 thread 4H5H)	(1) Modified Thread Form on Loaded Flank	Hardened Carbon Steel	Carbon Steel	300 Series Stainless Steel	(2) 7075-T6 Aluminum	Nylon Locking Element Blue or Black Temperature Limit 250˚ F/ 120˚ C	Hardened Carbon Steel	Hardened 400 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
CFN	▪					▪			▪				
FE			▪				▪						
FEO			▪				▪						
UL			▪				▪						
LAS			▪							▪			▪
LAC			▪									▪	▪
LA4			▪								▪		▪
LK		▪			▪								
LKS		▪					▪						
LKA		▪						▪					
PL	▪				▪				▪				
PLC	▪						▪		▪				
SL	▪				▪								
PEM RT®				▪	▪								

	Standard Finishes (3)									Optional Finish (3)(4)	For Use In Sheet Hardness: (5)				
							Floating Fastener								
							Retainer	Retainer	Nut						
Type	Zinc Plated per ASTM B633, SC1 (5µm), Type III, Colorless	Passivated and/or Tested Per ASTM A380	Passivated and/pr Tested Per ASTM 380 Plus Clear Dry-film Lubricant	(6) Black Dry-film Lubricant	(7) Black Dry-film Lubricant Over Phosphate	Plain	Zinc Plated, 5µm, Color-less	Passivated and/or Tested Per ASTM A380	Black Dry-film Lubricant	Zinc Plated per ASTM B633, SC1 (5µm), Type III, Yellow	HRB 88/ HB 183 or Less	HRB 80/ HB 150 or Less	HRB 70/ HB 125 or Less	HRB 60/ HB 107 or Less	HRB 50/ HB 89 or Less
CFN	▪									▪				▪	
FE				▪									▪		
FEO				▪									▪		
UL			▪										▪		
LAS							▪		▪				▪		
LAC								▪	▪				▪		
LA4								▪	▪		▪				
LK					▪								▪		
LKS				▪									▪		
LKA						▪									▪
PL	▪									▪			▪		
PLC		▪											▪		
SL	▪											▪			
PEM RT®	▪									▪		▪			
Finish Codes	ZI	None	CW	MD	MD		MD			ZC					

(1) Will accept a maximum material 6g/2A screw.
(2) Mating screws must be lubricated.
(3) See PEM Technical Support section of our web site for related plating standards and specifications.
(4) Special order with additional charge.
(5) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.
(6) MD finish on stainless steel provides a minimum of 100 hours of salt spray resistance.
(7) MD finish on steel provides a minimum of 24 hours of salt spray resistance.

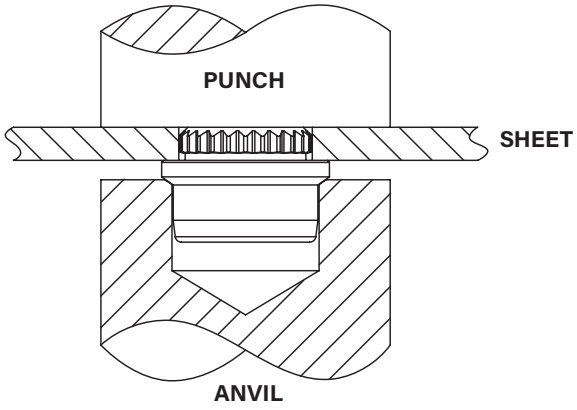
INSTALLATION

INSTALLATION NOTES

- For best results we recommend using a Haeger® or PEMSERTER® machine for installation of PEM® self-clinching fasteners. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process for select products.

CFN™ NUTS

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 over the shank of the fastener (preferably the punch side) as shown in drawing.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the shoulder of the fastener contacts the sheet.



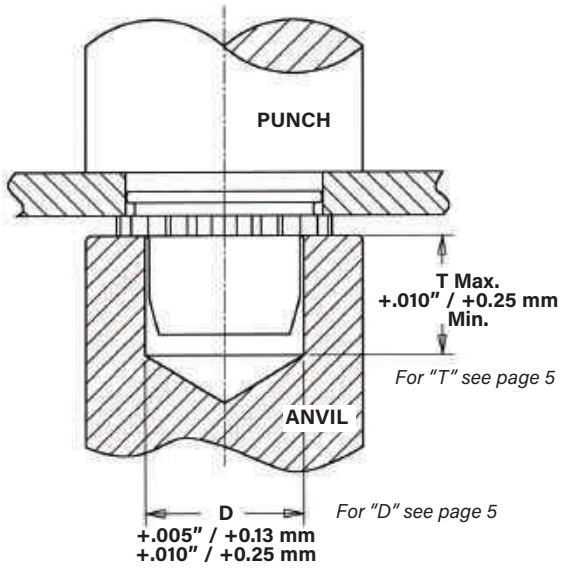
PEMSERTER® Installation Tooling

Type	Thread Code	Anvil Part Number	Punch Part Number
CFN	440/M3	8012038	975200048

FE™/FEO™/UL™ NUTS

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 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"/1.5 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 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 5.



INSTALLATION RECOMMENDATION

In applications for sheet thicknesses between the two ranges (see "Sheet Thickness" on page 5) 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.

PEMSERTER® Installation Tooling

Type	Thread Code	Anvil Part Number	Punch Part Number
UL	256/M2	975200020	975200048
FE/FEO	440/M3	975200021	975200048
FE/FEO	632/M3.5	975200022	975200048
FE/FEO	832/M4	975200023	975200048
FE/FEO	032/M5	975200024	975200048
FE/FEO	0420	975200025	975200048
FE/FEO	M6	8013143	975200048

LAS™/LAC™/LA4™ NUTS

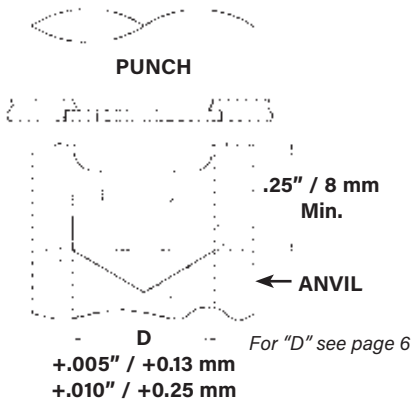
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into the anvil hole and place the mounting hole (preferably the punch side) over the shank of the fastener.
3. With installation punch and anvil surfaces parallel, apply sufficient squeezing force until flange contacts mounting sheet (LAC/LAS) or until anvil contacts the mounting sheet (LA4). Drawings show suggested tooling for applying these forces.

PEMSERTER® Installation Tooling

Type	Thread Code	Anvil Part Number	Punch Part Number
LAC/LAS	440/M3	975200006	975200048
LAC/LAS	632	8013890	975200048
LAC/LAS	832/M4	8013891	975200048
LAC/LAS	032/M5	8013892	975200048
LAC/LAS	0420/M6	975200010	975200048

Type	Thread Code	Anvil Part Number	Punch Part Number
LA4	440/M3	8013889	975200048
LA4	632	8013890	975200048
LA4	832/M4	8013891	975200048
LA4	032/M5	8013892	975200048

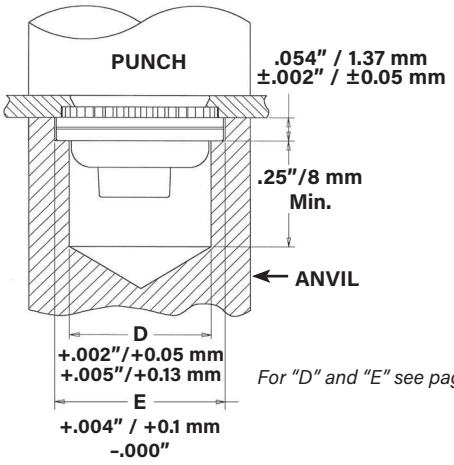
LAC/LAS



For "D" see page 6

LA4

Tooling for installation into stainless steel sheets



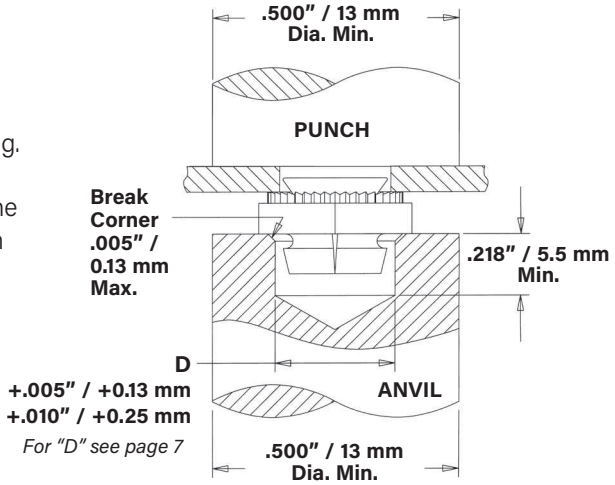
For "D" and "E" see page 6

LK™/LKS™/LKA™ NUTS

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 over the shank of fastener (preferably the punch side) as shown in drawing.
3. With installation punch and anvil surfaces parallel, apply squeezing force until hexagonal shoulder contacts mounting sheet. Sketch at the right shows suggested tooling for applying these forces. Installation force and performance data shown below.

PEMSERTER® Installation Tooling

Type	Thread Code	Anvil Part Number	Punch Part Number
LK/LKS/LKA	256/M2.5	975200015	975200048
LK/LKS/LKA	440/M3	975200016	975200048
LK/LKS/LKA	632	975201242	975200048
LK/LKS/LKA	832/M4	975201241	975200048
LK/LKS/LKA	032/M5	975200019	975200048

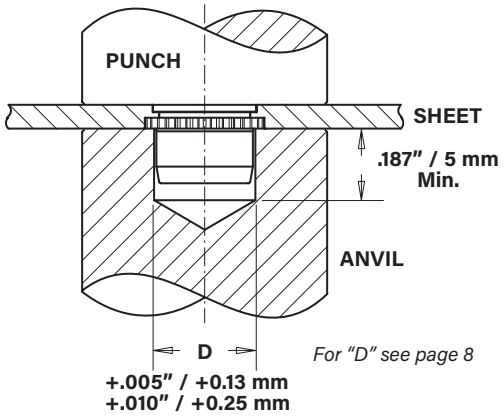


For "D" see page 7

PL™/PLC™ NUTS

Sheet thickness .060" to .070" / 1.53 mm to 1.78 mm

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 over the shank of the fastener (preferably the punch side) as shown in drawing.
3. With the punch and anvil surfaces parallel, apply a squeezing force until the knurled collar is flush with the top sheet.



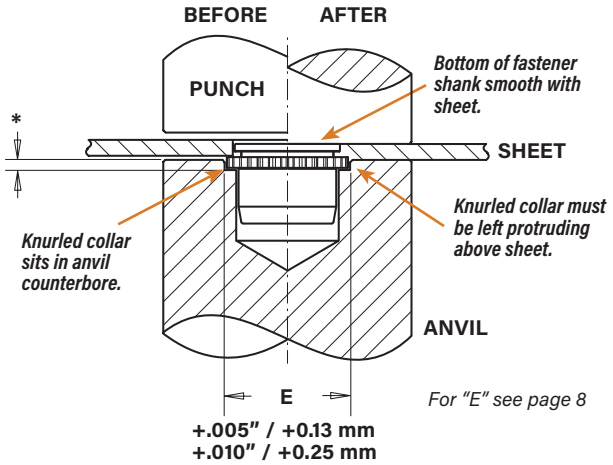
For "D" see page 8

PEMSERTER® Installation Tooling

Type	Thread Code	Anvil Part Number	Punch Part Number
PL/PLC	440/M3	975200011	975200048
PL/PLC	632	975200012	975200048
PL/PLC	832/M4	975200013	975200048
PL/PLC	032/M5	975200014	975200048

Sheet thickness .040" to .060" / 1 mm to 1.53 mm

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 over the shank of the fastener (preferably the punch side) as shown in drawing.
3. With the punch and anvil surfaces parallel, apply a squeezing force until the fastener shank is flush with the underside of the sheet. This should be accomplished by setting the depth of the counterbore in the anvil to the difference between the "A" dimension and the sheet thickness*. 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.

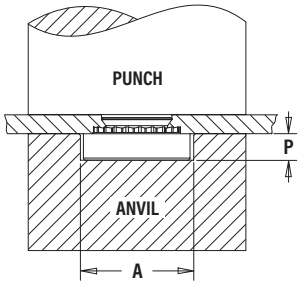


For "E" see page 8

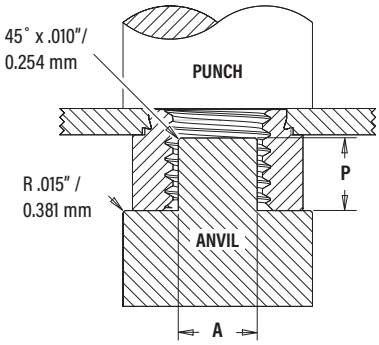
SL™ NUTS

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 over the shank of the fastener (preferably the punch side) as shown in drawing.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the head of the nut comes into contact with the sheet material.

COUNTERBORE ANVIL
Thread Sizes #2-56 to 5/16 and M2 to M8



PROTRUSION ANVIL
CLS/S Nuts Thread Sizes 3/8,1/2, M10 and M12



PEMSERTER® Installation Tooling

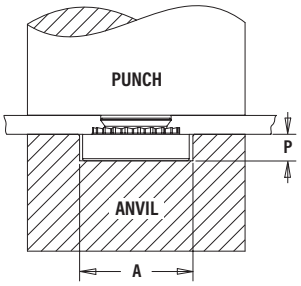
	Thread Code	Anvil Dimensions (in.) A ±.002	Anvil Dimensions (in.) P ±.005	Anvil Part Number	Punch Part Number
UNIFIED	440	.267	.045	975200034	975200048
	632	.298	.045	975200035	975200048
	832	.330	.070	975200036	975200048
	032	.361	.070	975200037	975200048
	0420	.454	.150	975200038	975200048
	0518	.515	.200	975200039	975200048
	0616	.280	.250	975200045(1)	975200048

	Thread Code	Anvil Dimensions (mm) A ±0.05	Anvil Dimensions (mm) P ±0.13	Anvil Part Number	Punch Part Number
METRIC	M3	6.78	1.14	975200034	975200048
	M3.5	7.57	1.14	975200035	975200048
	M4	8.38	1.78	975200036	975200048
	M5	9.17	1.78	975200037	975200048
	M6	11.53	3.81	975200038	975200048
	M8	13.08	5.08	975200039	975200048
	M10	7.62	6.35	8005682(1)	975200901400

(1) Large nut anvils use protrusion to locate part instead of counterbore.

PEM RT® NUTS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into the anvil hole and place the mounting hole (preferably the punch side) over the shank of the fastener as shown in diagram to the right.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the head of the nut comes into contact with the sheet material.



PEMSERTER® Installation Tooling

	Thread Code	Anvil Dimensions (in.) A ±.002	Anvil Dimensions (in.) P ±.005	Anvil Part Number	Punch Part Number
UNIFIED	RT440	.267	.045	975200034	975200048
	RT632	.298	.045	975200035	975200048
	RT832	.330	.070	975200036	975200048
	RT032	.361	.070	975200037	975200048
	RT0420	.454	.150	975200038	975200048
	RT0518	.517	.200	975200039	975200048

	Thread Code	Anvil Dimensions (mm) A ±0.05	Anvil Dimensions (mm) P ±0.13	Anvil Part Number	Punch Part Number
METRIC	RTM3	6.78	1.14	975200034	975200048
	RTM4	8.38	1.78	975200036	975200048
	RTM5	9.17	1.78	975200037	975200048
	RTM6	11.53	3.81	975200038	975200048
	RTM8	13.08	5.08	975200039	975200048

CLINCH FASTENER PERFORMANCE DATA

CFN™ NUTS (1)

UNIFIED	Thread Locking Specifications		Test Sheet Material		
Thread Code	Max. First On Prevailing Torque (in. lbs.)	Min. First Off Prevailing Torque (in. lbs.)	.040" Cold-rolled Steel		
			Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
440	3	0.38	1000	10	4

METRIC	Thread Locking Specifications		Test Sheet Material		
Thread Code	Max. First On Prevailing Torque (N·m)	Min. First Off Prevailing Torque (N·m)	1 mm Cold-rolled Steel		
			Installation (kN)	Pushout (N)	Torque-out (N·m)
M3	0.339	0.042	4.45	44.5	0.45

FE™/FEO™/UL™ NUTS (1)(2)

UNIFIED			Test Sheet Material					
			5052-H34 Aluminum			Cold-rolled Steel		
Type	Thread Code		Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
FEO	440		900	88	12	1500	140	12
FE				135	12		210	12
FEO	632		1200	105	20	2100	185	20
FE			1300	175			255	
FEO	832		1500	155	48	2500	260	48
FE				255			360	
FEO	032		1500	155	48	2500	260	48
FE				255			360	
FE	0420		2100	320	110	3500	420	110
	0428							

METRIC			Test Sheet Material					
			5052-H34 Aluminum			Cold-rolled Steel		
Type	Thread Code		Installation (kN)	Pushout (N)	Torque-out (N·m)	Installation (kN)	Pushout (N)	Torque-out (N·m)
FEO	M3		4	391	1.35	6.7	622	1.35
FE				600			934	
FEO	M4		6.7	689	5.42	11.1	1156	5.42
FE				1134			1601	
FEO	M5		6.7	689	5.42	11.1	1156	5.42
FE				1134			1601	
FE	M6		9.4	1423	12.43	15.6	1868	12.43

UNIFIED				Test Sheet Material					
				5052-H34 Aluminum			Cold-rolled Steel		
Type	Thread Code	Shank Code		Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
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				Test Sheet Material					
				5052-H34 Aluminum			Cold-rolled Steel		
Type	Thread Code	Shank Code		Installation (kN)	Pushout (N)	Torque-out (N·m)	Installation (kN)	Pushout (N)	Torque-out (N·m)
UL	M2	1		4	89	0.45	5.8	133	0.45

(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. For details, see chart on page 21.

LAS™/LAC™ NUTS (1)(2)

	Thread Code	Shank Code	Test Sheet Material								
			2024-T3 Aluminum			5052-H34 Aluminum			Cold-Rolled Steel		
			Installation (lbs.)	Retainer Pushout (lbs.)	Retainer Torque-out (in. lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)	Retainer Torque-out (in. lbs.)	Installation (lbs.)	Retainer Pushout (lbs.)	Retainer Torque-out (in. lbs.)
UNIFIED	440	1	3000	220	65	1500	215	65	3000	300	85
		2		225	150	2000	225	80			150
	632	1	3000	235	110	2000	240	140	3000	300	150
		2		275	150		250	150			175
	832	1	3000	240	110	2000	250	140	3000	300	150
		2		300	150		265	150		400	200
	032	1	3500	300	150	2000	300	150	3500	400	150
		2			200		350	175		450	200
	0420	2	5000	300	325	3000	400	325	5000	500	325
	0428										

	Thread Code	Shank Code	Test Sheet Material								
			2024-T3 Aluminum			5052-H34 Aluminum			Cold-Rolled Steel		
			Installation (kN)	Retainer Pushout (N)	Retainer Torque-out (N·m)	Installation (kN)	Retainer Pushout (N)	Retainer Torque-out (N·m)	Installation (kN)	Retainer Pushout (N)	Retainer Torque-out (N·m)
METRIC	M3	1	13.3	978	7.3	6.7	956	7.3	13.3	1334	9.6
		2	13.3	1000	16.9	8.9	1000	9	13.3	1334	16.9
	M4	1	13.3	1067	12.4	8.9	1112	15.8	13.3	1334	16.9
		2	15.6	1334	16.9	8.9	1178	16.9	13.3	1779	22.6
	M5	1	15.6	1334	16.9	8.9	1334	16.9	15.6	1779	16.9
		2	16.6	1334	22.6	8.9	1556	19.7	15.6	2001	22.6
	M6	2	22.2	1334	36.7	13.3	1779	36.7	22.2	2224	36.7

LA4™ NUTS (1)(2)

	Thread Code	Test Sheet Material		
		300 Series Stainless Steel		
		Installation (lbs.)	Retainer Pushout (lbs.)	Retainer Torque-out (in. lbs.)
UNIFIED	440	9000	200	85
	632	10000	200	85
	832	12000	200	85
	032	13000	250	125

	Thread Code	Test Sheet Material		
		300 Series Stainless Steel		
		Installation (kN)	Retainer Pushout (N)	Retainer Torque-out (N·m)
METRIC	M3	40	890	9.6
	M4	53	890	9.6
	M5	57	1100	14.1

(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) Thread locking performance is equivalent to applicable NASM25027 specifications. For details, see chart on page 21.

LK™/LKS™/LKA™ NUTS (1)(2)

	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.)
UNIFIED	256	1	1600	130	20	3000	150	20
		2	2000	150	30	3000	160	20
	440	1	1600	130	25	3000	150	30
		2	2000	200	35	3000	250	40
	632	1	2400	130	25	4000	150	45
		2	2700	225	45	4300	275	50
	832	1	2700	150	45	4000	190	50
		2	3000	250	50	4300	300	70
	032	1	3200	150	90	4000	250	100
		2	3200	250	105	4300	300	120

	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)
METRIC	M2.5	1	7.1	578	2.3	13.3	667	2.3
		2	8.9	667	3.4	13.3	711	2.3
	M3	1	7.1	578	2.8	13.3	667	3.4
		2	8.9	890	4	13.3	1112	4.5
	M4	1	12	667	5.1	17.8	845	5.6
		2	13.3	1112	5.7	19.1	1334	7.9
	M5	1	14.2	667	10.2	17.8	1112	11.3
		2	14.2	1112	11.9	19.1	1334	13.6

PL™/PLC™ NUTS (1)(2)

	Thread Code	Test Sheet Material											
		.060" 5052-H34 Aluminum			.040" 5052-H34 Aluminum			.060" Cold-rolled Steel			.048" Cold-rolled Steel		
		Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
UNIFIED	440	2000	225	20	1500	160	20	3000	260	20	3000	225	20
	632	2000	285	30	1500	180	25	3000	290	30	3000	270	30
	832	2000	290	60	1500	180	28	3000	290	60	3000	270	60
	032	2000	300	70	1500	180	40	3000	350	70	3000	310	70

	Thread Code	Test Sheet Material											
		1.5 mm 5052-H34 Aluminum			1 mm 5052-H34 Aluminum			1.5 mm Cold-rolled Steel			1.2 mm Cold-rolled Steel		
		Installation (kN)	Pushout (N)	Torque-out (N • m)	Installation (kN)	Pushout (N)	Torque-out (N • m)	Installation (kN)	Pushout (N)	Torque-out (N • m)	Installation (kN)	Pushout (N)	Torque-out (N • m)
METRIC	M3	8.9	1000	2.25	6.67	710	2.25	13.34	1156	2.25	13.34	1000	2.25
	M4	8.9	1290	6.77	6.67	800	3.16	13.34	1290	6.77	13.34	1200	6.77
	M5	8.9	1330	7.9	6.67	800	4.51	13.34	1557	7.9	13.34	1380	7.9

(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) Thread locking performance is equivalent to applicable NASM25027 specifications. For details, see chart on page 21.

SL™ NUTS (1)

	Thread Code	Shank Code	Thread Locking Specifications		Test Sheet Material					
					5052-H34 Aluminum			Cold-rolled Steel		
			Max. Prevailing Torque (1st thru 3rd) (in. lbs.)	Min. Prevailing Torque (1st thru 3rd) (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
UNIFIED	440	1	5.75	0.4	1500 - 2000	90	10	2500 - 3500	125	15
		2				170	13		230	18
	632	1	10.5	0.8	2500 - 3000	95	17	3000 - 6000	130	20
		2				190	22		275	28
	832	1	18	1.2	2500 - 3000	105	23	4000 - 6000	145	35
		2				220	35		285	45
	032	1	21	1.65	2500 - 3000	110	32	4000 - 9000	180	40
		2				190	50		250	60
	0420	1	35	3.75	4000 - 7000	360	90	6000 - 9000	400	150
		2				360	125		400	150
	0518	1	53	4.75	4000 - 7000	380	120	6000 - 8000	420	165
		2				380	160		420	180
	0616	1	95	6.3	5000 - 8000	400	270	7000 - 11000	460	320
		2				400	270		460	320

	Thread Code	Shank Code	Thread Locking Specifications		Test Sheet Material					
					5052-H34 Aluminum			Cold-rolled Steel		
			Max. Prevailing Torque (1st thru 3rd) (N·m)	Min. Prevailing Torque (1st thru 3rd) (N·m)	Installation (kN)	Pushout (N)	Torque-out (N·m)	Installation (kN)	Pushout (N)	Torque-out (N·m)
METRIC	M3	1	0.67	0.04	6.7 - 8.9	400	1.13	11.2 - 15.6	550	1.7
		2				750	1.47		1010	2.03
	M3.5	1	1.2	0.08	11.2 - 13.5	400	1.92	13.4 - 26.7	570	2.3
		2				840	2.5		1210	2.3
	M4	1	2.1	0.13	11.2 - 13.4	470	2.6	18 - 27	645	4
		2				970	4		1250	5.1
	M5	1	2.4	0.18	11.2 - 15.6	480	3.6	18 - 38	800	4.5
		2				845	5.7		1112	6.8
	M6	1	4	0.3	18 - 32	1580	10.2	27 - 36	1760	17
		2				1580	14.1		1760	17
	M8	1	6	0.5	18 - 32	1570	13.6	27 - 36	1870	18.7
		2				1570	18.1		1870	20.3
	M10	1	12	0.8	22 - 36	1760	32.7	32 - 50	2020	36.2
		2				1760	32.7		2020	36.2

(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.

PEM RT® NUTS (1)

UNIFIED

Type	Thread Code	Shank Code	Test Sheet Material	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
S	RT440	0	5052-H34 Aluminum	1500-2000	63	8
		1			90	10
		2			170	13
		0	Cold-rolled Steel	2500-3500	105	13
		1			125	15
		2			230	18
S	RT632	0	5052-H34 Aluminum	2500-3000	63	16
		1			95	17
		2			190	22
		0	Cold-rolled Steel	3000-6000	110	16
		1			130	20
		2			275	28
S	RT832	0	5052-H34 Aluminum	2500-3000	68	21
		1			105	23
		2			220	35
		0	Cold-rolled Steel	4000-6000	110	26
		1			145	35
		2			285	45
SS	RT032	0	5052-H34 Aluminum	2500-3500	68	26
		1			110	32
		2			190	50
		0	Cold-rolled Steel	4000-9000	120	32
		1			180	40
		2			320	60
S	RT0420	0	5052-H34 Aluminum	4000-7000	220	70
		1			360	90
		2				125
		0	Cold-rolled Steel	6000-8000	315	115
		1			400	150
		2				
S	RT0518	1	5052-H34 Aluminum	4000-7000	380	120
		2				160
		1	Cold-rolled Steel	6000-8000	420	165
		2				180

METRIC

Type	Thread Code	Shank Code	Test Sheet Material	Installation (kN)	Pushout (N)	Torque-out (N·m)
S	RTM3	0	5052-H34 Aluminum	6.7-8.9	280	0.9
		1			400	1.13
		2			750	1.47
		0	Cold-rolled Steel	11.2-15.6	470	1.47
		1			550	1.7
		2			1010	2.03
S	RTM4	0	5052-H34 Aluminum	11.2-13.4	300	2.37
		1			470	2.6
		2			970	4
		0	Cold-rolled Steel	18-27	490	2.95
		1			645	4
		2			1250	5.1
SS	RTM5	0	5052-H34 Aluminum	11.2-15.6	300	3
		1			480	3.6
		2			845	5.7
		0	Cold-rolled Steel	18-38	530	3.6
		1			800	4.5
		2			1420	6.8
S	RTM6	00	5052-H34 Aluminum	18-32	750	6.5
		0			970	7.9
		1			1580	10.2
		2				14.1
		00	Cold-rolled Steel	27-36	900	10
		0			1380	13
		1			1760	17
		2				
S	RTM8	1	5052-H34 Aluminum	18-32	1690	13.6
		2				18.1
		1	Cold-rolled Steel	27-36	1865	18.7
		2				20.3

(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.

AXIAL STRENGTH AND TIGHTENING TORQUE COMPARISON

Increasing Axial Strength →

	Thread Code	Types UL-0/FEO			Types UL-1/FE			Types PL/PLC			Type SL			Types LK/LKA/LKS/LAC/LAS/LA4		
		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw	
		Min. Axial Strength (lbs.) (1)	Strength Level (ksi) (2)	Tightening Torque (in. lbs.) (3)	Min. Axial Strength (lbs.) (1)	Strength Level (ksi) (2)	Tightening Torque (in. lbs.) (3)	Min. Axial Strength (lbs.) (1)	Strength Level (ksi) (2)	Tightening Torque (in. lbs.) (3)	Min. Axial Strength (lbs.) (4)	Strength Level (ksi) (4)	Tightening Torque (in. lbs.) (5)	Min. Axial Strength (lbs.) (7)	Strength Level (ksi) (7)	Tightening Torque (in. lbs.) (5)
UNIFIED	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	897	149	13.1	1,085	180	15.8	1,085	180	15.8
	632	546	60	9.8	847	93	15.2	1,036	114	18.6	1,636	180	29.4	1,636	180	29.4
	832	779	56	16.6	1,213	87	25.9	1,179	84	25.1	2,270 (6)	180	48.4	2,522	180	53.8
	032	779	39	19.2	1,213	61	30.0	1,246	62	30.8	2,880 (6)	180	71.1	3,600	180	88.9
	0420	—	—	—	1,412	44	45.9	—	—	—	5,728	180	186	5,728	180	186
	0518	—	—	—	—	—	—	—	—	—	9,437	180	383	—	—	—
	0616	—	—	—	—	—	—	—	—	—	13,948	180	680	—	—	—

Increasing Axial Strength →

	Thread Code	Types UL-0/FEO			Types UL-1/FE			Types PL/PLC			Type SL			Types LK/LKA/LKS/LAC/LAS/LA4		
		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw		Locknut	Mating Screw	
		Min. Axial Strength (kN) (1)	Strength Level (MPa) (2)	Tightening Torque (N·m) (3)	Min. Axial Strength (kN) (1)	Strength Level (MPa) (2)	Tightening Torque (N·m) (3)	Min. Axial Strength (kN) (1)	Strength Level (MPa) (2)	Tightening Torque (N·m) (3)	Min. Axial Strength (kN) (4)	Strength Level (MPa) (4)	Tightening Torque (N·m) (5)	Min. Axial Strength (kN) (7)	Strength Level (MPa) (7)	Tightening Torque (N·m) (5)
METRIC	M2	—	—	—	1.39	432	0.36	—	—	—	—	—	—	—	—	—
	M3	2.08	267	0.81	3.16	405	1.23	4.03	517	1.57	6.14	1220	2.39	6.14	1220	2.39
	M4	3.48	255	1.81	5.42	398	2.82	5.21	382	2.71	9.64 (6)	1220	5.01	10.71	1220	5.57
	M5	3.48	158	2.26	5.42	246	3.52	5.6	255	3.64	12.63 (6)	1220	8.21	17.3	1220	11.2
	M6	—	—	—	6.28	201	4.9	—	—	—	24.55	1220	19.1	24.55	1220	19.1
	M8	—	—	—	—	—	—	—	—	—	44.66	1220	46.5	—	—	—
	M10	—	—	—	—	—	—	—	—	—	70.75	1220	92	—	—	—

(1) Axial strength for UL, FEO, FE, PL and PLC locknuts are 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 min 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 heat treated steel 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. For screws of other materials, never exceed the lower of this reduced torque or the tightening torque recommended for the screw. If higher strength screws are used, torque is not adjusted upward because assemble strength is still limited by locknut strength.

(4) Unless otherwise noted, (see note 6) SL locknuts have axial strength exceeding the min tensile strength of 180 ksi/Property Class 12.9 screws. Contact tech support regarding assemble strength for higher strength screws.

(5) Tightening torque shown will induce preload of 65% of locknut min 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. All tightening torques shown are based on 180 ksi/ Property Class 12.9 screws. For lower strength heat treated steel screws the tightening torque is proportionately less. For example, for 120 ksi screws (Grade 5), torque is 67% of value shown. For 900 MPa screws (Property Class 9.8) torque value is 74% of value shown. For screws of other materials, never exceed the lower of this reduced torque or the tightening torque recommended for the screw.

(6) Due to limited nut height in this size, failure mode is screw stripping and axial strength value shown is slightly less than min tensile strength of 180 ksi/ Property class 12.9 screw.

(7) All LK, LKS, LKA, LAC, LAS and LA4 locknuts have axial strength exceeding the min tensile strength of 180 ksi/Property Class 12.9 screws. Contact tech support regarding assemble strength for higher strength screws.

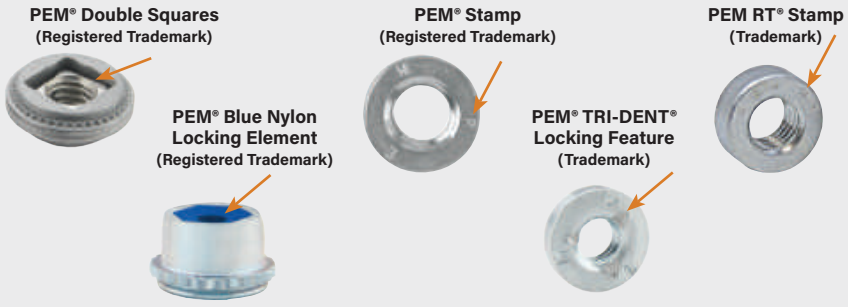
NASM25027 AS APPLIED TO PEM® SELF-CLINCHING, SELF-LOCKING NUTS

PEM FE, FEO, LAS, LAC, LA4, LK, LKS, LKA, PL and PLC locknuts are produced to meet the prevailing locking torque requirements of NASM25027. Specification NASM25027 is a rather lengthy spec which includes many requirements for attributes such as tensile strength and wrenching strength which are not applicable to PEM self-clinching, self-locking nuts. It is difficult for those not familiar with the specification to determine exactly which portions of it apply to the locking torque of PEM self-clinching, self-locking nuts. This matter is further complicated by the fact that many of the requirements in the specification that do apply, apply only to qualification and are not so called "quality conformance inspections" which need to be applied to every lot of product. The fact of the matter is that only one test (room ambient temperature locking torque per the first row of Table IV) needs to be applied on a regular basis of PEM self-clinching, self-locking nuts. This requirement is defined by Table XIV and the permanent set test is not required per footnote 1. The requirements for this test are given in Paragraphs 3.8.2.2.1 and 3.8.2.2.2. The test method is specified in paragraphs 4.5.3.3. and 4.5.3.3.4.1. For convenience of those who do not have access to this specification and/or are not familiar with specification language, these test requirements and test methods are re-stated below in layman's terms.

The one required test is a 15 cycle re-usability test. There are two values of torque which are required by specification. The first is a maximum torque value which dare not be exceeded anytime during the 15 installation and removal cycles. The second is a minimum breakaway torque which must be met during the 15th removal cycle. These torque values are shown in Table III of specifications NASM25027. They are also listed below for PEM fastener sizes only and also for metric sizes.

Details of the test procedure and significant definitions can be found on our web site at:
http://www.pemnet.com/files/design_info/techsheets/NASM25027.pdf

	Maximum Locking Torque (Any Cycle)		Minimum 15th Cycle Breakaway Torque	
Thread Size	**in. lbs.**	**N•m**	**in. lbs.**	**N•m**
#2-56	2.5	0.28	0.2	0.023
#4-40	5	0.57	0.5	0.057
#6-32	10	1.13	1.0	0.113
#8-32	15	1.7	1.5	0.17
#10-24	18	2.03	2.0	0.226
#10-32	18	2.03	2.0	0.226
1/4-20	30	3.39	4.5	0.509
1/4-28	30	3.39	3.5	0.396
M2.5	3.8	0.43	0.38	0.043
M3	5	0.56	0.5	0.056
M3.5	10	1.13	1.0	0.113
M4	15	1.7	1.5	0.17
M5	18	2.03	2.0	0.22
M6	28.3	3.2	3.3	0.37



To be sure that you are getting genuine PEM® brand fasteners, look for the unique PEM product markings and identifiers.

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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