

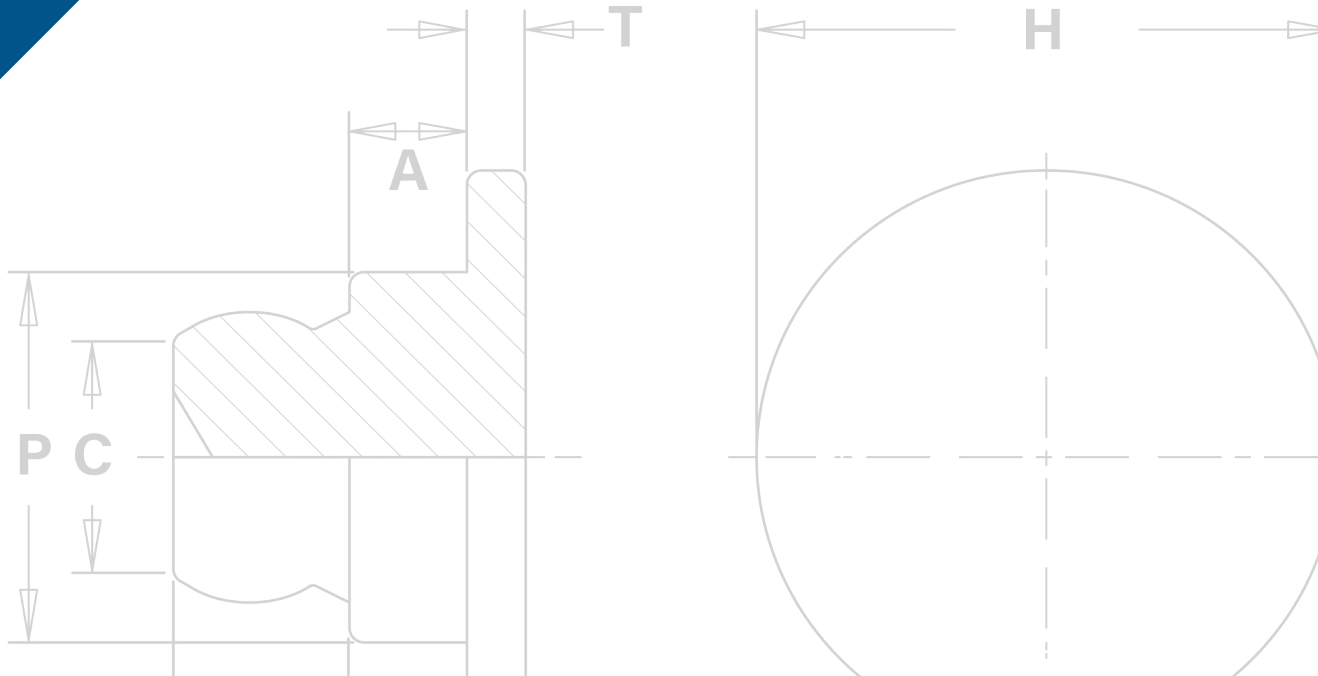


PEM® brand microPEM® fasteners  
are ideal for today's and tomorrow's  
compact electronics



# MPF™

micro **PEM**®  
FASTENERS



## IDEAL FOR TODAY'S AND TOMORROW'S COMPACT ELECTRONICS

- Wearables (smart watches, cameras, fitness bands, headphones, etc.)
- Laptops
- Tablets/eReaders
- Cell/Smart Phones
- Gaming/Hand Held Devices/Virtual Reality
- Infotainment/Automotive Electronics



Parts for smaller and/or thinner applications have been designed. Please contact us for more information.

<p><b>MPP™ microPEM® Self-clinching Pins</b> Ideal for positioning and alignment applications- <b>PAGE 3</b></p>		<p><b>MSOFS™ microPEM® Flaring Standoffs</b> Attach permanently in any type of panel, including metal, plastic and PC board. Flaring feature allows for captivation of multiple panels - <b>PAGE 8</b></p>	
<p><b>MSO4™ microPEM® Self-clinching Standoffs</b> Designed for mounting and/or spacing in extremely limited space applications - <b>PAGE 3</b></p>		<p><b>SMTSO™ microPEM® Surface Mount Fasteners</b> These fasteners for compact electronic assemblies attach to PC boards for nut/standoff applications. These fasteners mount on PC boards in the same manner and at the same time as other surface mount components prior to the automated reflow solder process - <b>PAGE 9</b></p>	
<p><b>TA™/T4™ microPEM® TackPin® Fasteners</b> Enable sheet-to-sheet attachment, replacing costly screw installation in applications where disassembly is not required - <b>PAGE 4</b></p>		<p><b>microPEM® Screws</b> Available in thread codes as small as M0.8 and lengths as short as 1 mm / .039" - <b>PAGE 10</b></p>	
<p><b>TKA™/TK4™ microPEM® TackSert® Pins</b> Enables attachment of metal sheets to plastic, replacing costly screw installation in applications where disassembly is not required - <b>PAGE 5</b></p>		<p><b>Material and finish specifications - PAGE 11</b></p>	
<p><b>TS4™ microPEM® TackScrew™ Fasteners</b> Enable cost effective sheet-to-sheet attachment by simply pressing into place. Can be removed by simply unscrewing, similar to other threaded fasteners - <b>PAGE 6</b></p>		<p><b>Installation - PAGES 12 - 14</b></p>	
<p><b>MSIA™/MSIB™ microPEM® Inserts For Plastics</b> Designed for use in straight or tapered holes. The symmetrical design eliminates the need for orientation. They are installed by pressing them into the mounting hole with ultrasonic equipment or with a thermal press - <b>PAGE 7</b></p>		<p><b>Performance data - PAGES 15 - 16</b></p>	

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



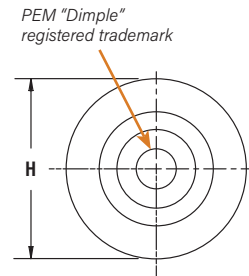
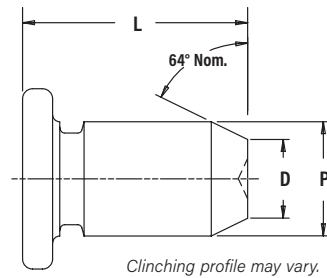
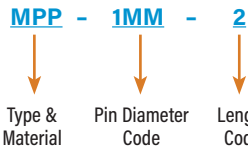
Fastener drawings and models are available at [www.pemnet.com](http://www.pemnet.com)

## MPP™ microPEM® SELF-CLINCHING PINS

- Satisfy demanding micro positioning and alignment applications
- Head mounts flush into panels as thin as 0.5 mm / .020"
- Chamfered end makes mating hole alignment easy
- Can be installed into stainless steel sheets
- Excellent corrosion resistance
- Can be installed automatically



### PART NUMBER DESIGNATION



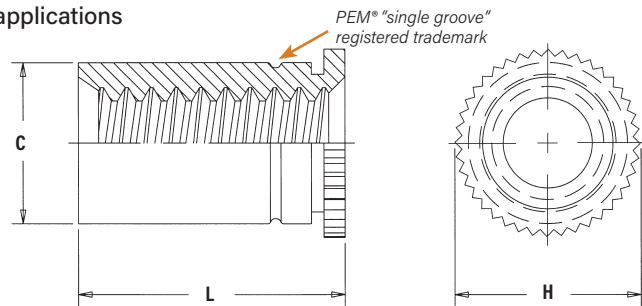
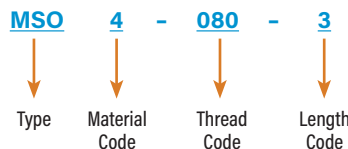
Pin Diameter P ±0.038mm	Type Stainless Steel	Pin Diameter Code	Length Code "L" ± 0.15 mm (Length Code in millimeters)							Min. Sheet Thickness		Hole Size In Sheet +0.025 mm / +.001"		D ±0.1 mm / ±.004"		H ±0.25 mm / ±.010"		Min. Distance Hole $\varnothing$ To Edge	
			2	3	4	5	-	-	-	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
1	MPP	1MM	2	3	4	5	-	-	-	0.5	.020	1.05	.041	0.7	.028	1.6	.063	2.05	.081
1.5	MPP	1.5MM	-	3	4	5	6	8	-	0.5	.020	1.55	.061	1.03	.041	2.24	.088	2.6	.102
2	MPP	2MM	-	-	4	5	6	8	10	0.5	.020	2.05	.081	1.36	.054	3.02	.119	4.4	.173

## MSO4™ microPEM® SELF-CLINCHING STANDOFFS

- Designed for mounting and/or spacing in extremely limited space applications
- Can be installed into stainless steel sheets<sup>(1)</sup>
- Have stronger threads than weld standoffs because they are made from heat-treated 400 Series Stainless Steel
- Can be installed automatically



### PART NUMBER DESIGNATION



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code	Min. Sheet Thickness	Hole Size In Sheet +.002 -.000	C Max.	H Nom.	L +.002 -.003	Min. Dist. Hole $\varnothing$ To Edge
		Stainless Steel								
	.060-80 (#0-80) <sup>(2)</sup>	MSO4	080	3	.012	.095	.094	.125	.094	.090
				4					.125	
	.086-56 (#2-56) <sup>(2)</sup>	MSO4	256	3	.012	.125	.124	.156	.094	.120
				4					.125	

All dimensions are in millimeters.

METRIC	Thread Size	Type	Thread Code	Length Code	Min. Sheet Thickness	Hole Size In Sheet +0.05	C Max.	H Nom.	L +0.05 - 0.08	Min. Dist. Hole $\varnothing$ To Edge
		Stainless Steel								
	M1 x 0.25 <sup>(3)</sup>	MSO4	M1	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M1.2 x 0.25 <sup>(3)</sup>	MSO4	M1.2	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M1.4 x 0.3 <sup>(4)</sup>	MSO4	M1.4	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M1.6 x 0.35 <sup>(5)</sup>	MSO4	M1.6	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M2 x 0.4 <sup>(5)</sup>	MSO4	M2	2	0.3	3.18	3.16	3.96	2	3
				3					3	

(1) MSO4 standoffs are designed for use in sheet hardness HRB 88 / HB 183 or less. For installation into harder sheets (up to HRC 36), contact our Tech Support line or your local representative.

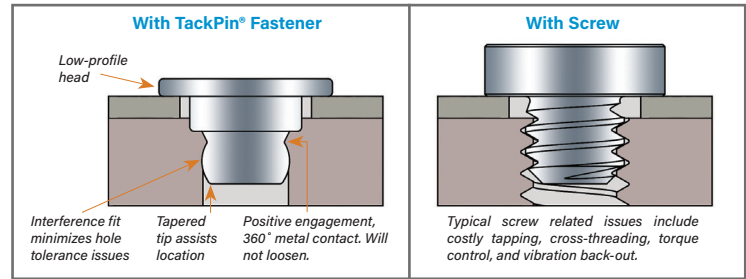
(2) Unified ASME B11, 2B  
 (3) Miniature ISO 68-1, 5H  
 (4) Miniature ISO 68-1, 6H  
 (5) Metric ASME B1.13M, 6H

## TA™/T4™ microPEM® TackPin® FASTENERS

- Reduce installation time vs. a screw
- Simple, press in installation eliminates many costs and concerns associated with micro screws:
  - Cross threading
  - Tapping
  - Tightening torque control
  - Vibrational back-out
- Low profile head provides space savings
- Tapered tip aligns fastener in hole
- Interference fit minimizes hole tolerance issues
- Easily installed automatically



### Comparison of TackPin® fastener to screw installation.

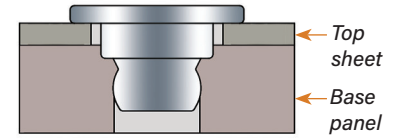
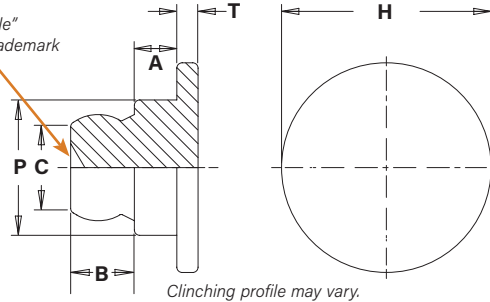


### PART NUMBER DESIGNATION

TA - 10 - 025  
T4 - 10 - 025

Type & Material  
Base Panel Hole Size Code  
Top Sheet Thickness Code

PEM® "Dimple" registered trademark

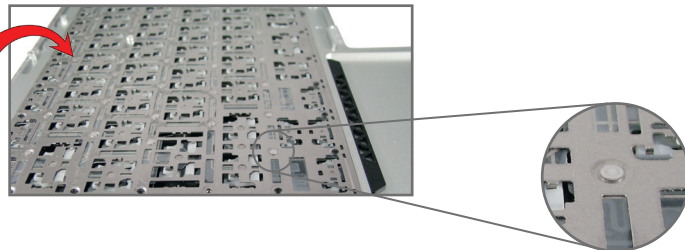


Can be installed into blind or through hole application.

Type	Aluminum	Stainless Steel	Base Panel Hole Size Code	Top Sheet Thickness Code	Top Sheet Thickness		Base Panel Min. Sheet Thickness (1)		Top Sheet Hole Size ±0.05 mm / ±.002"		Base Panel Hole Size -0.05 mm / -.002"		A ±0.025 mm / ±.001"		B ±0.075 mm / ±.003"		C Max.	H ±0.1 mm / ±.004"		P ±0.05 mm / ±.002"		T ±0.1 mm / ±.004"		Min. Dist. Hole To Edge	
					mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.		mm	in.	mm	in.	mm	in.		
TA	T4	10	025	0.2-0.28	.008-.011	0.89	.035	1.47	.058	1.02	.040	0.406	.016	0.610	.024	0.89	.035	2	.079	1.3	.051	0.2	.008	1	.039
TA	T4	10	050	0.48-0.56	.019-.022	0.89	.035	1.47	.058	1.02	.040	0.686	.027	0.610	.024	0.89	.035	2	.079	1.3	.051	0.2	.008	1	.039
TA	-	10	075	0.71-0.79	.028-.031	0.89	.035	1.47	.058	1.02	.040	0.914	.036	0.610	.024	0.89	.035	2	.079	1.3	.051	0.2	.008	1	.039

(1) 0.89 mm / .035" for blind holes and 0.5 mm / .020" for through holes.

TackPin® and TackSert® fasteners have been specified to replace screws to attach a super-thin membrane to a very thin substrate in keyboards. The switch to TackPin® fasteners significantly reduced assembly costs.



## CUSTOM microPEM® TackPin® FASTENER SOLUTIONS

### Countersunk TackPin® Fastener

- Installs into a countersunk hole, replacing countersunk screws.
- Offers flush or near flush appearance.

### Large Head TackPin® Fastener

- TackPin with a large head installed into boss of bottom panel.
- Holds down top panel that is free to rotate around the boss.

### Flush-head TackPin® Fastener

- TackPin installed into a thicker, softer top-sheet and pressed flush.

### Thin Sheet TackPin® Fastener

- Simple, press-in installation.
- Enables sheet-to-sheet attachment of multiple layers.
- Flush or sub-flush on both sides of sheet.
- Head mounts flush into top sheets as thin as .008"/0.2 mm.

### FlexTack™ Fastener

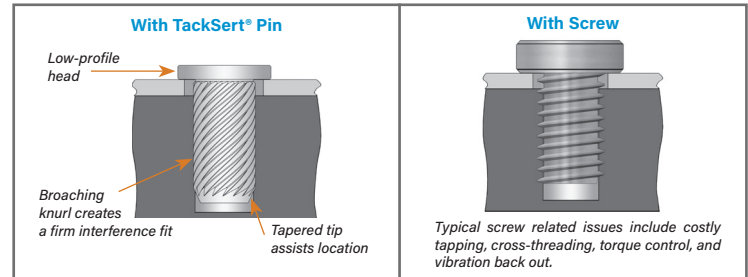
- The Belleville shaped head flattens upon a simple press-in installation.
- Draws mounts together to accommodate vertical stack tolerances.



## TKA™/TK4™ microPEM® TackSert® PINS

- Suitable for installation into plastics, metal castings and other brittle materials
- Reduce installation time vs. a screw
- Simple, press in installation (does not require heat or ultrasonics) eliminates many costs and concerns associated with micro screws:
  - Cross threading
  - Use of inserts / tapping
  - Tightening torque control
  - Vibrational back-out
- Low profile head provides space savings
- Tapered tip aligns fastener in hole
- Easily installed automatically

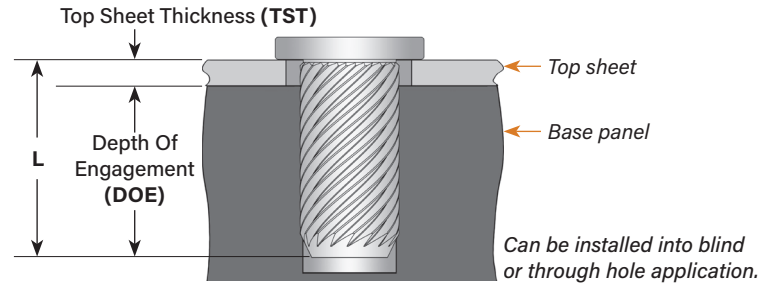
### Comparison of TackSert® pin to screw installation.



### PART NUMBER DESIGNATION

**TKA** - **10** - **xxx**  
**TK4** - **10** - **xxx**

↓                      ↓                      ↓  
 Type & Material    Base Panel Hole Size Code    Length Code



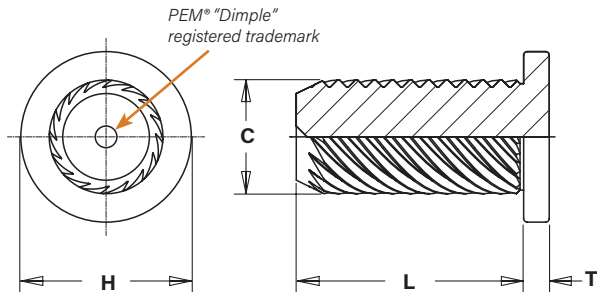
$$DOE = L - TST \quad DOE \geq 0.8 \text{ mm} / .0315''$$

#### For through hole applications

$$DOE - 0.25 \text{ mm} / .010'' = \text{Min. Sheet}$$

#### For blind hole applications

$$DOE + 0.25 \text{ mm} / .010'' = \text{Min. Blind Hole Depth}$$

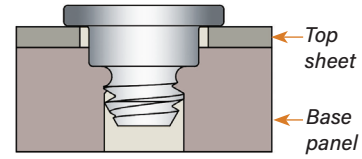


Type		Base Panel Hole Size Code	Length Code	Top Sheet Hole Size $\pm 0.05 \text{ mm} / \pm .002''$		Base Panel Hole Size $-0.05 \text{ mm} / -.002''$		Top Sheet Thickness Max.		C Max.	H $\pm 0.08 \text{ mm} / \pm .003''$		L $\pm 0.06 \text{ mm} / \pm .002''$		T $\pm 0.08 \text{ mm} / \pm .003''$		Min. Dist. Hole $\odot$ To Edge <sup>(1)</sup>		
Fastener Material	400 series stainless steel			mm	in.	mm	in.	mm	in.		mm	in.	mm	in.	mm	in.	mm	in.	
Aluminum	TK4	10	100	1.3	.051	1	.039	0.2	.008	1.2	.047	1.8	.071	1	.039	0.27	.011	1.18	.047
TKA	TK4	10	150	1.3	.051	1	.039	0.7	.028	1.2	.047	1.8	.071	1.5	.059	0.27	.011	1.18	.047
TKA	TK4	10	200	1.3	.051	1	.039	1.2	.047	1.2	.047	1.8	.071	2	.079	0.27	.011	1.18	.047
TKA	TK4	10	250	1.3	.051	1	.039	1.7	.067	1.2	.047	1.8	.071	2.5	.098	0.27	.011	1.18	.047
TKA	TK4	10	300	1.3	.051	1	.039	2.2	.087	1.2	.047	1.8	.071	3	.118	0.27	.011	1.18	.047

(1) Minimum boss diameter is twice centerline-to-edge value.

## TS4™ microPEM® TackScrew™ FASTENERS

- Allows for 1-cycle re-usability by unscrewing and then reinstallation with thread locking adhesive
- Reduce installation time vs. a screw
- Simple, press in installation eliminates many costs and concerns associated with micro screws:
  - Cross threading
  - Tapping
  - Tightening torque control
  - Vibrational back-out
- Low profile head provides space savings
- Tapered tip aligns fastener in hole
- Interference fit minimizes hole tolerance issues
- Easily installed automatically



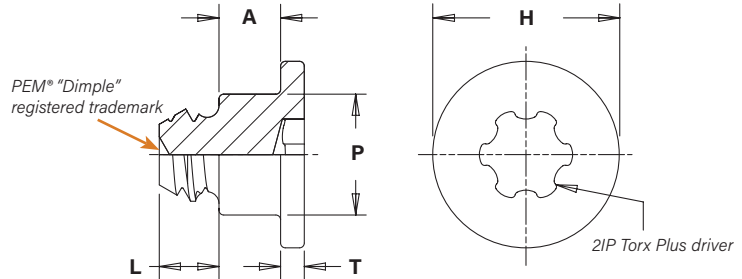
Can be installed into blind or through hole applications.

### PART NUMBER DESIGNATION

**TS4** - **10** - **025**

↓                      ↓                      ↓

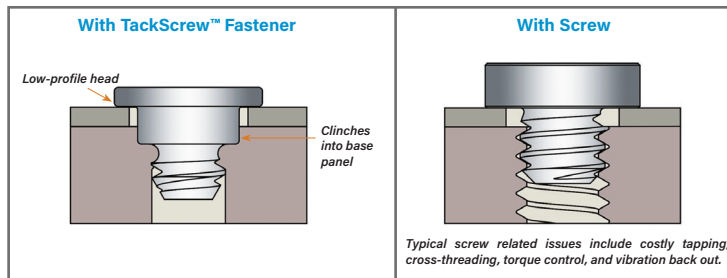
Type & Material      Base Panel Hole Size Code      Top Sheet Thickness Code



Type Material	Base Panel Hole Size Code	Top Sheet Thickness Code	Top Sheet Thickness		Base Panel Min. Sheet Thickness <sup>(1)</sup>		Top Sheet Hole Size ±0.05 mm / ±.002"		Base Panel Hole Size ±0.025 mm / ±.001"		A ±0.05 mm / ±.002"		H ±0.1 mm / ±.004"		L ±0.1 mm / ±.004"		P ±0.05 mm / ±.002"		T ±0.1 mm / ±.004"		Min. Dist. Hole $\varnothing$ To Edge	
			mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.		
TS4	10	025	0.2 - 0.28	.008 - .011	0.91	.036	1.47	.058	0.99	.039	0.406	.016	2	.079	0.64	.025	1.3	.051	0.25	.010	1	.039
TS4	10	050	0.48 - 0.56	.019 - .022	0.91	.036	1.47	.058	0.99	.039	0.686	.027	2	.079	0.64	.025	1.3	.051	0.25	.010	1	.039

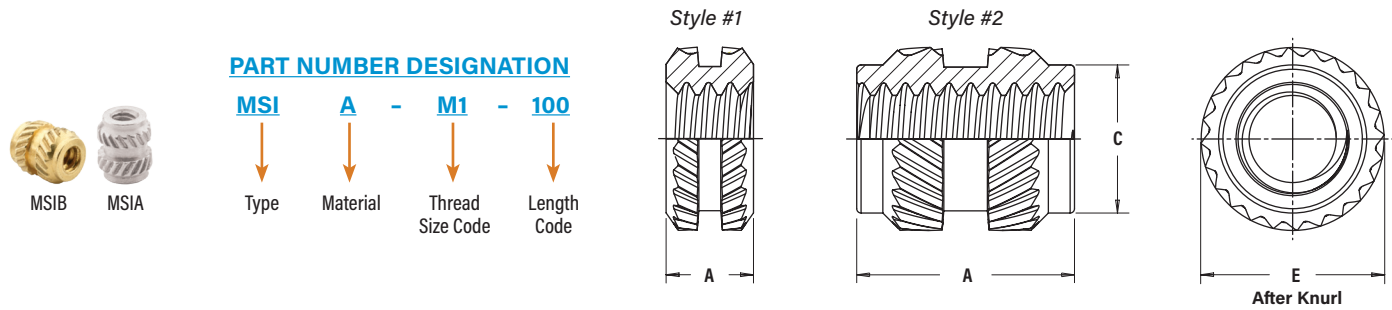
(1) Minimum sheet to prevent protrusion from through hole or minimum blind hole depth.

### Comparison of TackScrew™ fastener to screw installation.



## MSIA™/MSIB™ microPEM® INSERTS FOR PLASTICS

- Symmetrical design eliminates the need for orientation
- Provides excellent performance in wide range of plastics
- Aluminum inserts offer light weight, lead-free alternative



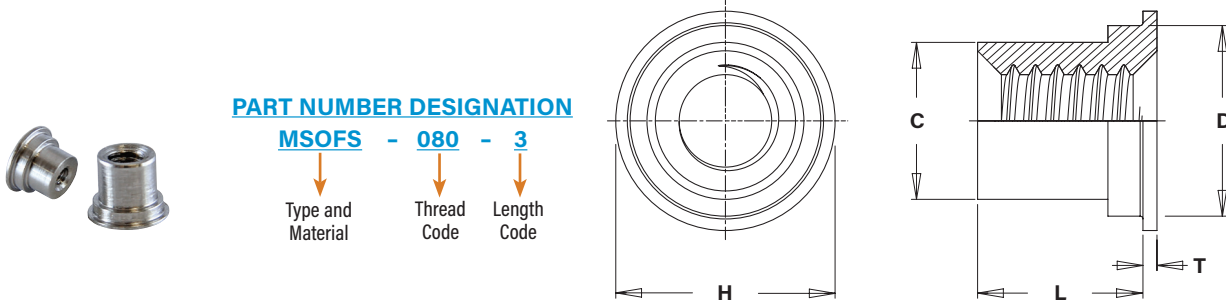
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type		Thread Code	Length Code	A ±0.1	E ± 0.1	C Max.	Mounting Hole in Material		
		Aluminum	Brass						Min. Wall Thickness (6)	Hole Depth Min.	Hole Diameter +0.05
		M1 x 0.25 (3)	MSIA						MSIB	M1	100(1) 250(2)
M1.2 x 0.25 (3)	MSIA	MSIB	M1.2	100(1) 250(2)	1 2.5	2.1	— 1.75	0.7	1.77 3.27	1.75	
M1.4 x 0.3 (4)	MSIA	MSIB	M1.4	150(2) 300(2)	1.5 3	2.5	2.15	0.8	2.27 3.77	2.15	
M1.6 x 0.35 (5)	MSIA	MSIB	M1.6	150(2) 300(2)	1.5 3	2.5	2.15	0.8	2.27 3.77	2.15	
M2 x 0.4 (5)	MSIA	MSIB	M2	300(2) 400(2)	3 4	3.2	2.85	1.6	3.77 4.77	2.85	

- (1) Style #1 - length codes less than 150  
 (2) Style #2 - length codes 150 and greater  
 (3) Metric ISO 68-1, 5H  
 (4) Metric ISO 68-1, 6H  
 (5) Metric ASME B1.13M, 6H  
 (6) Refers to wall thickness of boss as tested in ABS and polycarbonate.

## MSOFS™ microPEM® FLARING STANDOFFS

- MSOFS™ microPEM® flaring standoffs attach permanently in thin panels of any hardness, including stainless steel
- No minimum sheet thickness**
- Can be installed into any type or hardness of panel, including metal, plastic and PC board
- Flaring feature allows for captivation of multiple panels
- Fastener captivation method allows for reduced centerline-to-edge designs



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code	Sheet Thickness	Hole Size in Sheet +.002 -.000	C Max.	D Max.	H Nom.	L +.002 -.003	T ±.002	Min. Dist. Hole $\varnothing$ to Edge
	.060-80 (#0-80) <sup>(1)</sup>	MSOFS	080	3 4	.008 - .012	.118	.094	.117	.138	.093 .125	.010	.069
.086-56 (#2-56) <sup>(1)</sup>	MSOFS	256	3 4	.008 - .012	.138	.113	.137	.157	.093 .125	.010	.079	

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length Code	Sheet Thickness	Hole Size in Sheet +0.05	C Max.	D Max.	H Nom.	L +0.05 -0.08	T ±0.05	Min. Dist. Hole $\varnothing$ to Edge
	M1 x 0.25 <sup>(2)</sup>	MSOFS	M1	2 3	0.2 - 0.3	3	2.39	2.97	3.5	2 3	0.25	1.75
M1.2 x 0.25 <sup>(2)</sup>	MSOFS	M1.2	2 3	0.2 - 0.3	3	2.39	2.97	3.5	2 3	0.25	1.75	
M1.4 x 0.3 <sup>(3)</sup>	MSOFS	M1.4	2 3	0.2 - 0.3	3	2.39	2.97	3.5	2 3	0.25	1.75	
M1.6 x 0.35 <sup>(4)</sup>	MSOFS	M1.6	2 3	0.2 - 0.3	3.5	2.87	3.48	4	2 3	0.25	2	
M2 x 0.4 <sup>(4)</sup>	MSOFS	M2	2 3	0.2 - 0.3	3.5	2.87	3.48	4	2 3	0.25	2	

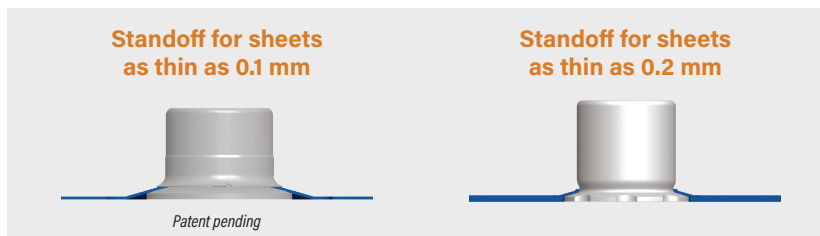
(1) Internal, ASME B1.1, 2B

(2) Metric ISO 68-1, 5H

(3) Metric ISO 68-1, 6H

(4) Metric ASME B1.13M, 6H

## ALTERNATIVE THIN SHEET CLINCH FASTENER SOLUTIONS

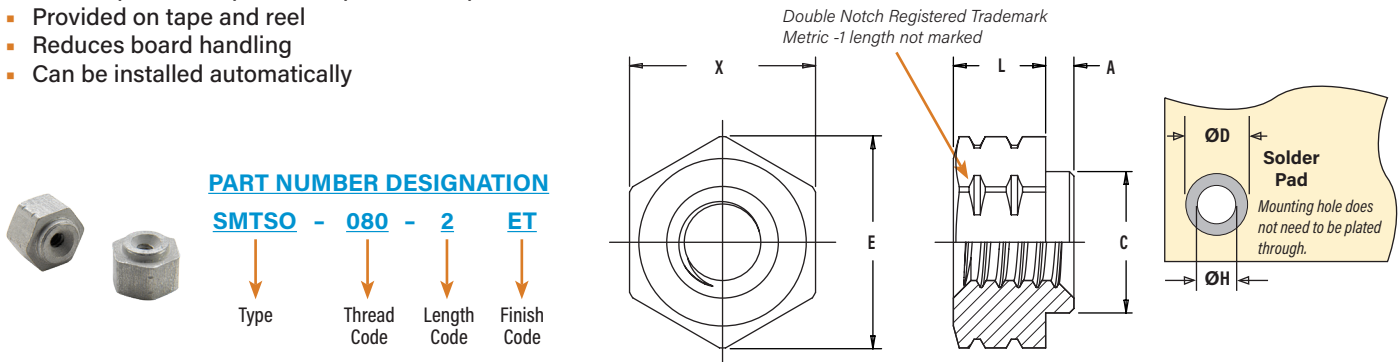


Contact [techsupport@pemnet.com](mailto:techsupport@pemnet.com) for more information.



## SMTSO™ microPEM® SURFACE MOUNT FASTENERS

- Hex shaped barrel provides optimal size/performance
- Provided on tape and reel
- Reduces board handling
- Can be installed automatically



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code	Min. Sheet Thickness	A Max.	C Max.	E Ref.	L ±.003	X Nom.	ØH Hole Size In Sheet +.003 -.000	ØD Min. Solder Pad
	.060-80 (#0-80) (1)	SMTSO	080	2 4	.020	.019	.095	.144	.062 .125	.125	.098	.165

All dimensions are in millimeters.

METRIC	Thread Size	Type	Thread Code	Length Code	Min. Sheet Thickness	A Max.	C Max.	E Ref.	L ±0.08	X Nom.	ØH Hole Size In Sheet +0.08	ØD Min. Solder Pad
	S1 (2)	SMTSO	M1	1	0.5	0.48	2.41	3.66	1	3.18	2.5	4.19
2				2								
3				3								
S1.2 (2)	SMTSO	M1.2	1	0.5	0.48	2.41	3.66	1	3.18	2.5	4.19	
			2					2				
			3					3				
S1.4 (2)	SMTSO	M1.4	1	0.5	0.48	2.41	3.66	1	3.18	2.5	4.19	
			2					2				
			3					3				
M1.6 x 0.35 (3)	SMTSO	M1.6	1	0.5	0.48	2.41	3.66	1	3.18	2.5	4.19	
			2					2				
			3					3				

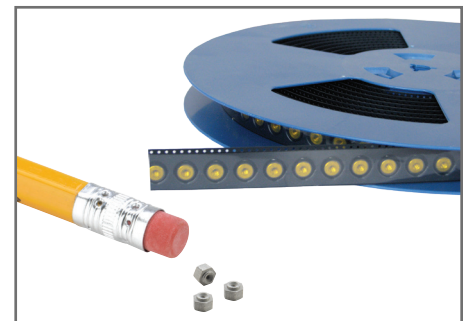
- (1) Unified ASME B1.1, 2B  
 (2) Miniature ISO 1501, 4H6  
 (3) Metric ASME B1.13M, 6H

### NUMBER OF PARTS PER REEL / PITCH (MM) FOR EACH SIZE

Thread/Thru-Hole Size	Length Code							
	1	2	3	4	6	8	10	12
080	—	3500 / 8	—	2000 / 8	—	—	—	—
M1, M1.2, M1.4, M1.6	3500 / 8	2500 / 8	2000 / 8	—	—	—	—	—

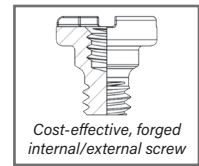
A polyimide patch is supplied to allow for reliable vacuum pickup. Fasteners are also available without a patch which may provide a lower cost alternative, depending on your installation methods/requirements.

Packaged on 330 mm recyclable reels. Tape width is 24 mm. Reels conform to EIA-481.



## microPEM® SCREWS (Available on special order. Minimum quantities may apply)

- Smallest thread code: M0.8
- Shortest length: 1 mm / .039"
- Fastener material: steel, stainless steel and aluminum
- Driver types: Torx®/Torx Plus®/Microstix®, cross-recess/internal hex
- Head styles: flat head/pan head/socket-head/wafer-head
- Special features: Locking patch, TAPTITE 2000®, FASTITE 2000®, PT® and DELTA PT®
- Platings: zinc, nickel, black nickel and black oxide

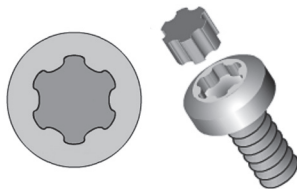


### DELTA PT® SCREWS



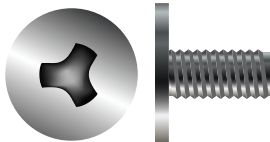
- Minimal radial tension due to optimized flank angle
- High clamp load
- High tensile and torsion strength
- Increased cycle stress stability
- High strength under vibration

### TORX PLUS® DRIVE SYSTEM



- 0° drive angle
- Elliptical geometric configuration maximizes drive bit engagement
- Large cross-sectional area at lobes
- Vertical sidewalls
- Optimizes torque transfer
- Virtually eliminates cam-out
- Reduces end load and worker fatigue
- Reduces annual drive bit costs

### MICROSTIX® ULTRA-THIN-HEAD PRECISION SCREWS



- No cam-out
- No driving force
- High workability
- High torque transmission
- High precision bits
- Tamper proof
- High durability
- Better fit between bits and screws

PennEngineering is a licensee of Acument Global Technologies (Torx®, Torx Plus®), Reminc (TAPTITE 2000®, FASTITE 2000®), EJOT® (PT® and DELTA PT®) and OSG Corporation and OSG System Products Co., Ltd. (Microstix®).

MATERIAL AND FINISH SPECIFICATIONS

Type	Fastener Materials							Standard Finishes <sup>(1)</sup>			For Use in Sheet Hardness: <sup>(2)</sup>						
	Carbon Steel	Age Hardened A286 Stainless Steel	300 Series Stainless Steel	Hardened 400 Series Stainless Steel	Hardened Aluminum	Aluminum	Free-Machining Leaded Brass	Passivated and/or Tested Per ASTM A380	Electro-Plated Tin ASTM B 545, Class A, with Clear Preservative Coating, Annealed <sup>(3)</sup>	Plain Finish	HRB 50 / HB 89 or Less	HRB 88 / HB 183 or Less	HRB 92 / HB 202 or Less	PC Board	Plastics	Castings and Brittle Materials	Any Panel Hardness
MPP		▪						▪				▪					
MSO4				▪				▪				▪					
SMTSO	▪								▪				▪				
TA					▪					▪	▪						
T4				▪				▪				▪					
TKA					▪					▪			▪	▪			
TK4				▪				▪					▪	▪	▪		
TS4				▪				▪				▪					
MSIA						▪				▪				▪			
MSIB							▪			▪				▪			
MSOFS			▪					▪									▪
Part Number Codes For Finishes								None	ET	None							

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

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

(3) Optimal solderability life noted on packaging.

**A NOTE ABOUT HARDENED 400 SERIES STAINLESS STEEL**

In order for self-clinching fasteners to work properly, the fastener must be harder than the sheet into which it is being installed. In the case of stainless steel panels, fasteners made from 300 Series Stainless Steel do not meet this hardness criteria. It is for this reason that 400 series fasteners (MSO4, T4, TK4 and TS4) are offered. However, while these 400 Series fasteners install and perform well in 300 Series stainless sheets they should not be used if the end product:

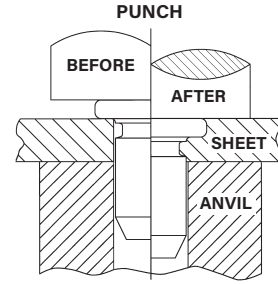
- Will be exposed to any appreciable corrosive presence
- Requires non-magnetic fasteners
- Will be exposed to any temperatures above 300°F (149°C)

If any of the these are issues, please contact [techsupport@pemnet.com](mailto:techsupport@pemnet.com) for other options.

INSTALLATION

MPP PINS

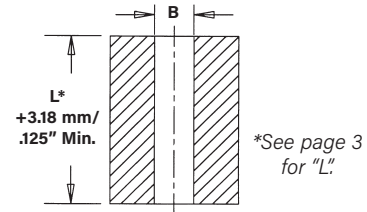
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert pin through mounting hole (preferably the punch side) of sheet and into anvil hole.
3. With installation punch and anvil surfaces parallel, apply squeezing force to embed the head of the pin flush in the sheet.



PEMSERTER® Installation Tooling

Type	Pin Diameter Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		B ±0.02			
MPP	1MM	1.07		8014168	8014167
MPP	1.5MM	1.57		8014169	8014167
MPP	2MM	2.07		8014170	8014167

Recommended Installation Anvil



Requirements for Installation into Stainless Steel

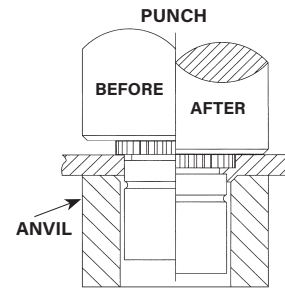
1. Sheet hardness must be less than the specified limit for the fastener.
2. Panel material should be in the annealed condition.
3. Fastener should be installed in punch side of hole.
4. Mounting hole punch should be kept sharp to minimize work hardening around hole.
5. Maintain the mounting hole punch diameter to no greater than .025 mm / .001\"/>

MSO4 STANDOFFS

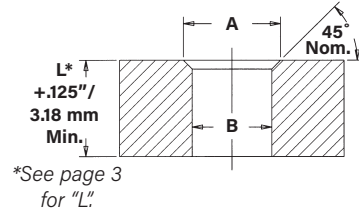
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert standoff through mounting hole (preferably the punch side) and into anvil as shown in drawing.
3. With installation punch and anvil surfaces parallel, apply only enough squeezing force to embed the head of the standoff flush in the sheet.

PEMSERTER® Installation Tooling

UNIFIED	Type	Thread Code	Anvil Dimensions (inches)		Anvil Part Number	Punch Part Number
			A	B		
	MSO4	080	.112 - .114	.097 - .099	8015796	975200997
	MSO4	256	.142 - .144	.127 - .129	8015797	975200997



Recommended Installation Anvil



METRIC	Type	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
			A	B		
	MSO4	M1	2.84 - 2.89	2.46 - 2.51	8015796	975200997
	MSO4	M1.2	2.84 - 2.89	2.46 - 2.51	8015796	975200997
	MSO4	M1.4	2.84 - 2.89	2.46 - 2.51	8015796	975200997
	MSO4	M1.6	2.84 - 2.89	2.46 - 2.51	8015796	975200997
	MSO4	M2	3.6 - 3.65	3.22 - 3.27	8015797	975200997

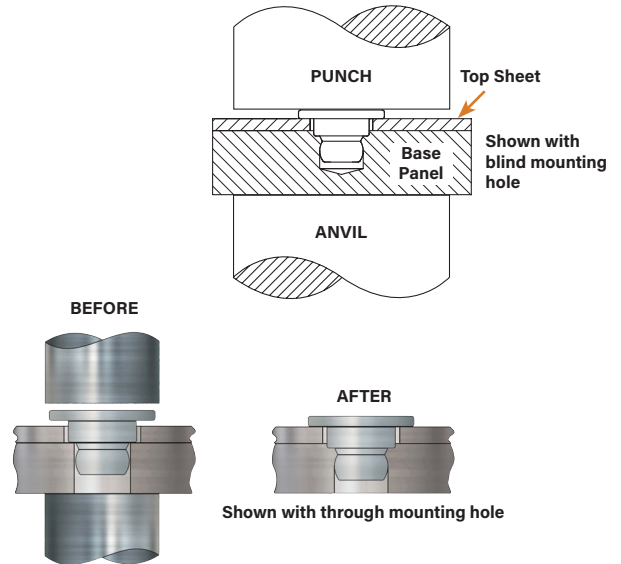
## INSTALLATION

### TA/T4 FASTENERS

1. Prepare properly sized mounting hole in top sheet and base panel. Base panel mounting hole can be through or blind.
2. Place top sheet and base panel in proper position.
3. Place fastener through hole in top sheet and into mounting hole (preferably the punch side) of base panel.
4. With installation punch and anvil surfaces parallel, apply squeezing force until the head of the fastener contacts the top sheet.

#### PEMSERTER® Installation Tooling

Size	Manual Punch Part Number	Manual Anvil Part Number
TA/T4-10-025	8014167	975200046
TA/T4-10-050		
TA/T4-10-075		

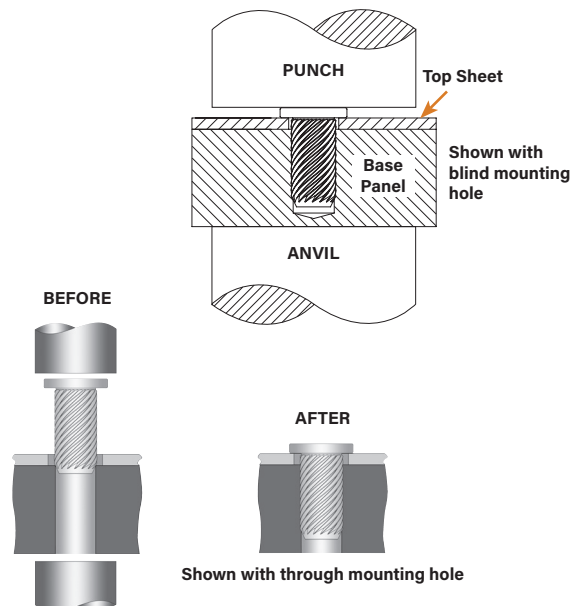


### TKA/TK4 PINS

1. Prepare properly sized mounting hole in top sheet and base panel. Base panel mounting hole can be through or blind.
2. Place top sheet and base panel in proper position.
3. Place pin through hole in top sheet and into mounting hole of base panel.
4. With installation punch and anvil surfaces parallel, apply squeezing force until the head of the pin contacts the top sheet.

#### PEMSERTER® Installation Tooling

Size	Punch Part Number	Anvil Part Number
TKA/TK4-10-100	8014167	975200046
TKA/TK4-10-150		
TKA/TK4-10-200		
TKA/TK4-10-250		
TKA/TK4-10-300		



#### INSTALLATION NOTES

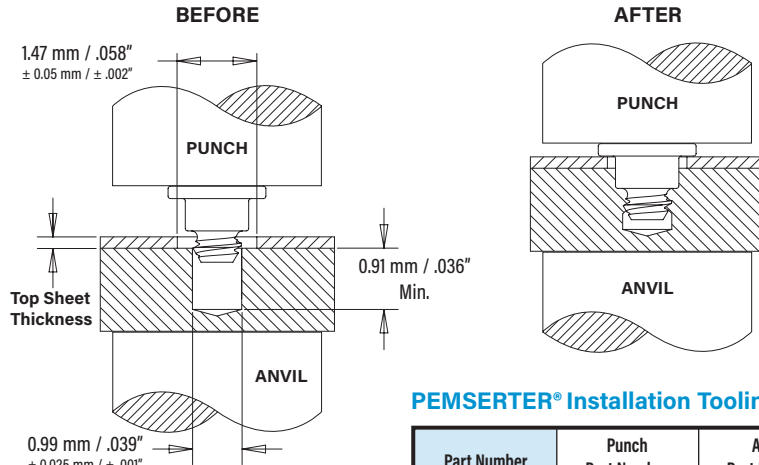
- For best results we recommend using a Haeger® or PEMSERTER® machine for installation of PEM self-clinching fasteners. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process [for select products](#).



## INSTALLATION

### TS4 FASTENERS

1. Prepare properly sized mounting hole in top sheet and base panel. Base panel mounting hole can be through or blind.
2. Place sheet and base panel in proper position.
3. Place fastener through hole in sheet and into mounting hole (preferably the punch side) of base panel.
4. With punch and anvil surfaces parallel, apply squeezing force until the head of the fastener contacts the top sheet.



### PEMSERTER® Installation Tooling

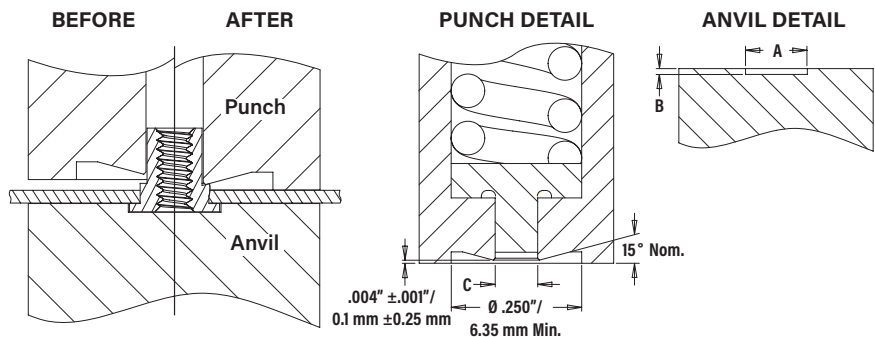
Part Number	Punch Part Number	Anvil Part Number
TS4-10-025	8014167	975200046
TS4-10-050		

### Re-installation (if necessary)

1. Place sheet and base panel in proper position.
2. Place adhesive into base panel mounting hole.
3. Place fastener through hole in top sheet and into mounting hole of base panel.
4. Screw in fastener with 2IP Torx Plus driver.

### MSOFS STANDOFFS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place the standoff into anvil recess and place the mounting hole over the standoff as shown in the drawing.
3. Using a punch flaring tool and a recessed anvil, apply squeezing force until punch contacts the sheet.

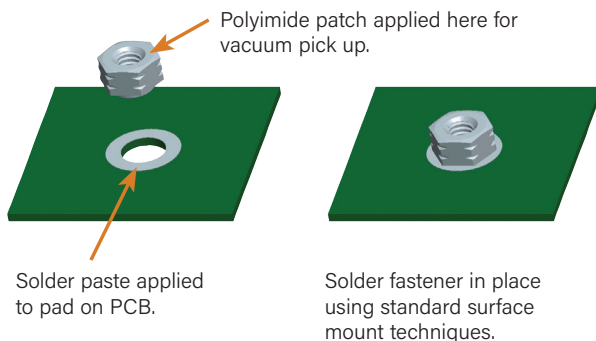


### PEMSERTER® Installation Tooling

UNIFIED	Thread Code	Punch Dimensions (in.)		Anvil Dimensions (in.)		Anvil Part Number
		C +.001	Punch Part Number	A ±.001	B ±.001	
	080	.095	8020712	.143	.006	8019720
	256	.114	8020710	.163	.006	8019722

METRIC	Thread Code	Punch Dimensions (mm)		Anvil Dimensions (mm)		Anvil Part Number
		C +.025	Punch Part Number	A ±.025	B ±.025	
	M1	2.41	8020712	3.64	0.15	8019720
	M1.2	2.41	8020712	3.64	0.15	8019720
	M1.4	2.41	8020712	3.64	0.15	8019720
	M1.6	2.9	8020710	4.14	0.15	8019722
	M2	2.9	8020710	4.14	0.15	8019722

### SMTSO FASTENERS



### Number of parts per reel/pitch (mm) for each size

Thread Code	Length Code			
	1	2	3	4
080	—	3500 / 8	—	2000 / 8
M1, M1.2, M1.4, M1.6	3500 / 8	2500 / 8	2000 / 8	—

Packaged on 330mm recyclable reels.  
Tape width is 16mm.  
Supplied with polyimide patch for vacuum pick up.  
Reels conform to EIA-481.

PERFORMANCE DATA<sup>(1)</sup>

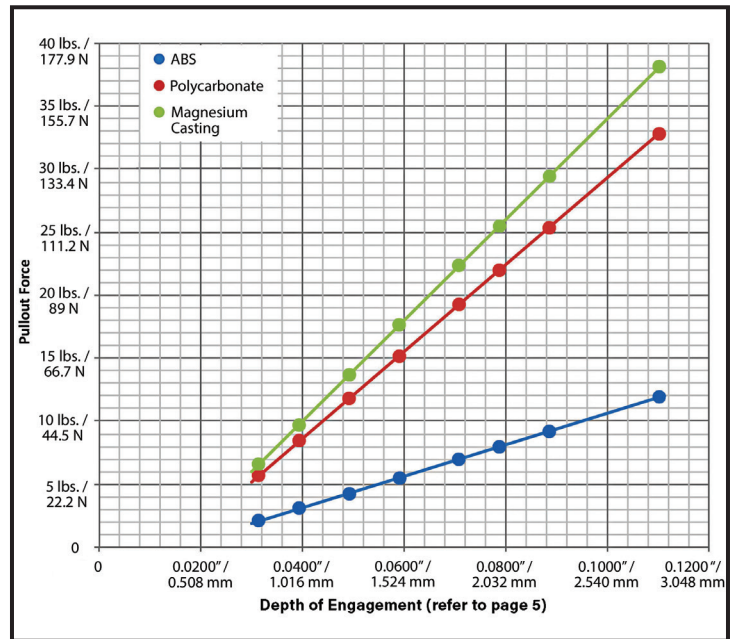
MSO4 STANDOFFS

UNIFIED	Type	Thread Code	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Sheet Thickness (in.)	Test Sheet Material			
					300 Series Stainless Steel			
					Installation (lbs.)	Pushout (lbs.)	Torque-out (in.lbs.) (2)	Pull-thru (lbs.) (2)
MSO4	080		.65	.013	2500	33	1.3	78
				.017	2500	45	2.2	
MSO4	256		1.3	.013	2500	33	2.2	110
				.017	2500	45	2.6	

METRIC	Type	Thread Code	Max. Rec. Tightening Torque For Mating Screw (N-m)	Sheet Thickness (mm)	Test Sheet Material			
					300 Series Stainless Steel			
					Installation (kN)	Pushout (N)	Torque-out (N-m) (2)	Pull-thru (N) (2)
MSO4	M1		0.019	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
MSO4	M1.2		0.036	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
MSO4	M1.4		0.057	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
MSO4	M1.6		0.084	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
MSO4	M2		0.175	0.3	11.1	150	0.25	500
				0.43	11.1	200	0.3	

TKA/TK4 PINS

Type	Test Base Panel Material	Depth Of Engagement (mm)	(in.)	Installation (N)	(lbs.)	Pullout (N)	(lbs.)
TKA-10	ABS	0.8	0.0315	133	30	9	2
		1	0.0394	133	30	14	3
		1.3	0.0492	133	30	19	4
		1.5	0.0590	178	40	24	6
		1.8	0.0708	178	40	31	7
		2	0.0787	222	50	35	8
		2.3	0.0886	222	50	41	9
TKA-10	Polycarbonate	0.8	0.0315	222	50	25	6
		1	0.0394	267	60	37	8
		1.3	0.0492	267	60	53	12
		1.5	0.0590	311	70	68	15
		1.8	0.0708	334	75	86	19
		2	0.0787	378	85	98	22
		2.3	0.0886	400	90	113	25
TK4-10	Magnesium Casting (AZ91D)	0.8	0.0315	445	100	29	7
		1	0.0394	489	110	43	10
		1.3	0.0492	534	120	61	14
		1.5	0.0590	578	130	78	18
		1.8	0.0708	623	140	99	22
		2	0.0787	667	150	113	25
		2.3	0.0886	712	160	131	29
		2.8	0.1102	801	180	169	38



TS4 FASTENERS

Part Number	Tested Top Sheet Thickness	5052-H34 Aluminum HRB 63 / HB T14						304 Stainless Steel HRB 89 / HB 187					
		Installation		Pullout <sup>(3)</sup>		Torque to Remove		Installation		Pullout <sup>(3)</sup>		Torque to Remove	
		(N)	(lbs.)	(N)	(lbs.)	(N-cm)	(in. oz.)	(N)	(lbs.)	(N)	(lbs.)	(N-cm)	(in. oz.)
TS4-10-025	0.254 mm / .01"	556	125	80	18	3.3	4.7	1423	320	125	28	4.6	6.5
TS4-10-050	0.533 mm / .021"												

(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) Performance in torque-out and pull-thru will depend on the strength and type of screw being used. In most cases the failure will be in the screw and not in the self clinching standoff. Please contact our Applications Engineering group with any questions.

(3) Pullout after initial installation.

## PERFORMANCE DATA

### MSOFS STANDOFFS

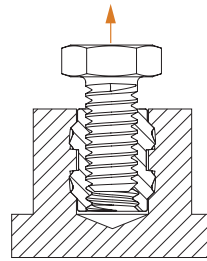
UNIFIED	Type	Thread Code	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Test Sheet Material		
				.008" 300 Series Stainless Steel		
				Installation (lbs.)	Pushout (lbs.)	Torque-out (in.lbs.) <sup>(1)</sup>
MSOFS	080	.65	1500	69.8	1.29	
MSOFS	256	1.3	1800	91.2	1.29	

METRIC	Type	Thread Code	Max. Rec. Tightening Torque For Mating Screw (N-m)	Test Sheet Material		
				0.2 mm 300 Series Stainless Steel		
				Installation (kN)	Pushout (N)	Torque-out (N-m) <sup>(1)</sup>
MSOFS	M1	0.019	6.67	311	0.146	
MSOFS	M1.2	0.036	6.67	311	0.146	
MSOFS	M1.4	0.057	6.67	311	0.146	
MSOFS	M1.6	0.084	8	406	0.146	
MSOFS	M2	0.175	8	406	0.146	

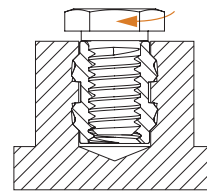
### MSIA/MSIB INSERTS

METRIC	Type	Thread Code	Length Code	Test Sheet Material			
				ABS		Polycarbonate	
				Pullout (N)	Torque-out (N-cm) <sup>(1)</sup>	Pullout (N)	Torque-out (N-cm) <sup>(1)</sup>
MSIA/MSIB	M1		100	50	3.5	50	4.5
			250	150	10	200	12
MSIA/MSIB	M1.2		100	50	3.5	50	4.5
			250	150	10	200	12
MSIA/MSIB	M1.4		150	100	15	140	15
			300	330	30	400	30
MSIA/MSIB	M1.6		150	100	15	140	15
			300	330	30	400	30
MSIA/MSIB	M2		300	335	35	410	33
			400	470	40	595	35

For testing purposes, inserts were installed using heat stake equipment into a flat sheet.

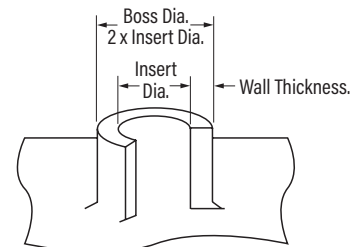


*Pullout* is the force required to pull the insert from the sheet.



*Torque-out* is the torque required to turn the insert in the parent material after installation without inducing clamp load on the fastener.

### HOLE PREPARATION GUIDELINES



Thinner walls and bosses may be used but will affect performance.

### SMTSO<sup>(2)(3)</sup> FASTENERS

Type and Size	Test Sheet Material			
	.062" Single Layer RF-4			
	Pushout (lbs.)	Pushout (N)	Torque-out (in. lbs.)	Torque-out (N-m)
SMTSO-080	85.1	378.7	4.94	0.56
SMTSO-M1				
SMTSO-M1.2				
SMTSO-M1.4				
SMTSO-M1.6				

### SMTSO TESTING CONDITIONS

Oven	Quad ZCR convection oven with 4 zones
High Temp	518 °F / 270 °C
Board Finish	62% Sn, 38% Pb
Screen Printer	Ragin Manual Printer
Vias	None
Spokes	2 Spoke Pattern
Paste (lead-free)	Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305)
Stencil	.0067" / 0.17mm thick

- (1) Torque-out performance will depend on the strength and type of screw being used. In most cases, the screw threads will fail before the insert threads.
- (2) With lead-free paste. Average values of 30 test points. The data presented here is for general comparison purposes only. Actual performance is dependent upon application variables. We will be happy to provide samples for you to install. If required, we can also test your installed hardware and provide you with the performance data specific to your application.
- (3) Further testing details can be found in our web site's literature section.

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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