PennEngineering®

Ideal for today's compact electronics

microPEM® FASTENERS

BULLETIN MPF

microPEM®

116
Rev 916

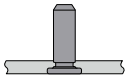
IDEAL FOR TODAY'S AND TOMORROW'S COMPACT ELECTRONICS

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

- Thread code as small as M0.8.
- Pin diameters as small as 0.7 mm.
- Standoff lengths as short as .028" / 0.7 mm.
- Clinches flush into sheets as thin as .012" / 0.3 mm.
- Attach sheets as thin as .008" / 0.2 mm.

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

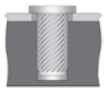
Type MPP™ microPEM® Self-clinching Pins
Ideal for micro positioning and alignment applications - PAGE 3



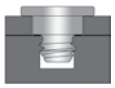
Type MSO4™ microPEM® Self-clinching Standoffs
Designed for mounting and/or spacing in extremely limited space applications - PAGE 3

Types TA™/T4™ microPEM® TackPin® Fasteners
Enable sheet-to-sheet attachment, replacing costly screw installation in applications where disassembly is not required - PAGE 4

Types TKA™/TK4™ microPEM® TackSert® Pins
Designed with diagonal knurl to hold a top panel to a bottom panel or chassis by broaching into the bottom panel/chassis. Type TKA pins are suitable for broaching into plastic applications, and Type TK4 pins are suitable for broaching into castings and brittle materials - PAGE 5



Type TS4™ microPEM® TackScrew™ Fasteners
Enable cost effective sheet-to-sheet attachment by simply pressing into place. Can be removed by simply unscrewing, similar to other threaded fasteners - PAGE 6



Type MSIB™ microPEM® Inserts For Plastics
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 - PAGE 7

Type SMTSO™ microPEM® Surface Mount Fasteners
These fasteners for compact electronic assemblies attach to P.C. Boards for nut/standoff applications. These fasteners mount on P.C. Boards in the same manner and at the same time as other surface mount components prior to the automated reflow solder process - PAGE 8

microPEM® Screws
Available in sizes as small as M0.8 and lengths as short as 1 mm / .039" - PAGE 8

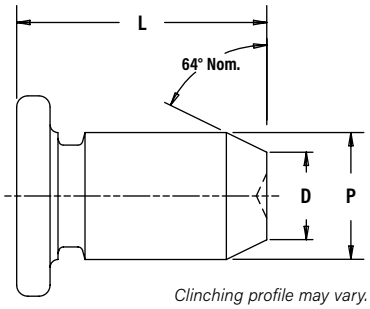
PEM® TYPE MPP™ microPEM® SELF-CLINCHING PINS

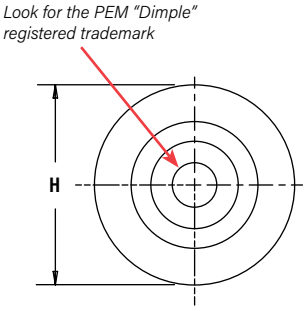
- Satisfy demanding micro positioning and alignment applications.
- Head mounts flush into panels as thin as 0.5 mm / .02".
- Chamfered end makes mating hole alignment easy.
- Can be installed into stainless steel sheets.
- Excellent corrosion resistance.
- Can be installed automatically.

PART NUMBER DESIGNATION

MPP - 1MM - 2

- MPP: Type & Material
- 1MM: Pin Diameter Code
- 2: Length Code





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 / ±.01"		Min. Distance Hole ℄ to Edge	
										mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
1	MPP	1MM	2	3	4	5	–	–	–	0.5	.02	1.05	.041	0.7	.028	1.6	.063	2.05	.081
1.5	MPP	1.5MM	–	3	4	5	6	8	–	0.5	.02	1.55	.061	1.03	.041	2.24	.088	2.6	.102
2	MPP	2MM	–	–	4	5	6	8	10	0.5	.02	2.05	.081	1.36	.054	3.02	.119	4.4	.173

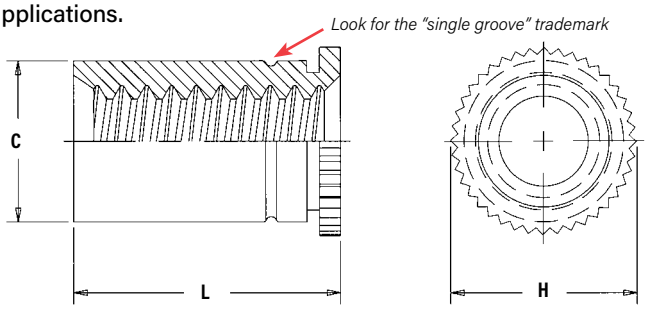
PEM® TYPE MSO4™ microPEM® SELF-CLINCHING STANDOFFS

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

PART NUMBER DESIGNATION

MSO 4 - 080 - 3

- MSO: Type
- 4: Material Code
- 080: Thread Code
- 3: Length Code



All dimensions are in inches.

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

All dimensions are in millimeters.

	Thread Size	Type Stainless Steel	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 ℄ To Edge
METRIC	S1 (3)	MSO4	M1	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	S1.2 (3)	MSO4	M1.2	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	S1.4 (3)	MSO4	M1.4	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M1.6 x 0.35 (4)	MSO4	M1.6	2	0.3	2.41	2.39	3.18	2	2.3
				3					3	
	M2 x 0.4 (4)	MSO4	M2	2	0.3	3.18	3.16	3.96	2	3
				3					3	

(1) Type 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.

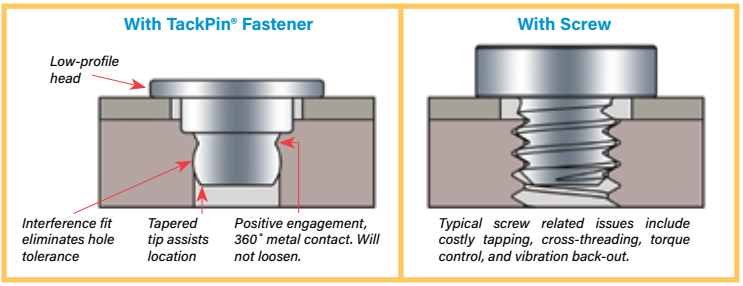
(2) Unified ASME B1.1, 2B (3) Miniature ISO 1501, 4H6 (4) Metric ASME B1.13M, 6H

PEM® TYPES TA™/T4™ microPEM® TackPin® FASTENERS

- Advantages over micro screws: eliminates costly tapping, cross threading, torque control, vibration back-out and installation time.
- Interference fit minimizes hole tolerance issues.
- Tapered tip assists location.
- Low-profile head provides space savings.
- Top sheet can be any material.
- Can be installed automatically.

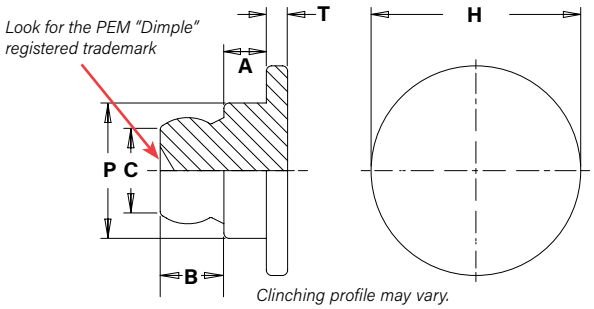
Patented.

Comparison of TackPin® fastener to screw installation.

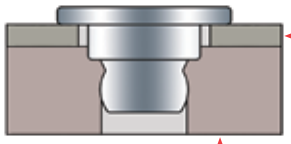


PART NUMBER DESIGNATION

TA	-	10	-	025
T4	-	10	-	025
Type & Material		Base Panel Hole Size Code		Top Sheet Thickness Code



Clinching profile may vary.

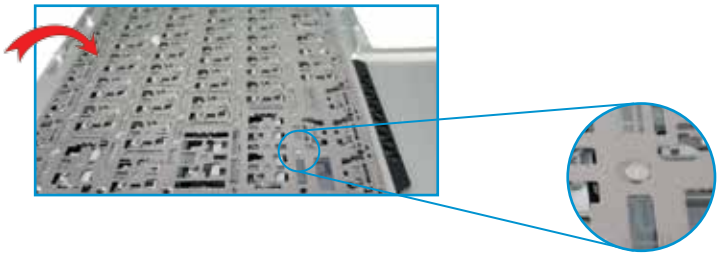


Base panel.
TackPin fastener installs into blind or through hole applications.

Type		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	
Alumi-num	Stain-less Steel			mm	in.	mm	in.	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.

In one notable application, TackPin® 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.

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.

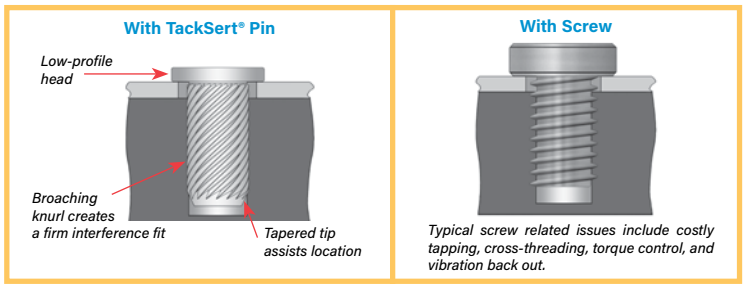
Flush-head TackPin® Fastener

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

PEM® TYPES TKA™/TK4™ microPEM® TackSert® PINS

- Secure panels to common cast materials such as magnesium and aluminum. Also appropriate for attaching panels to plastics such as ABS and to P.C. Boards.
- Simple, press-in installation. Does not require heat or ultrasonics.
- Alternative to micro screws, eliminating the need to tap or use threaded inserts.
- Top sheet can be any material.
- Low-profile head.
- Eliminates the following:
  - Cost of screw
  - Cost of patch to prevent loosening
  - Cost of threaded insert or tapped hole
  - Cost of driver bits
  - Cost of rework due to cross-threading and driver bit "cam-out".
- Can be installed automatically.

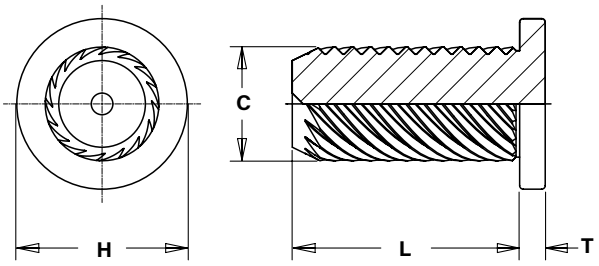
Comparison of TackSert® pin to screw installation.

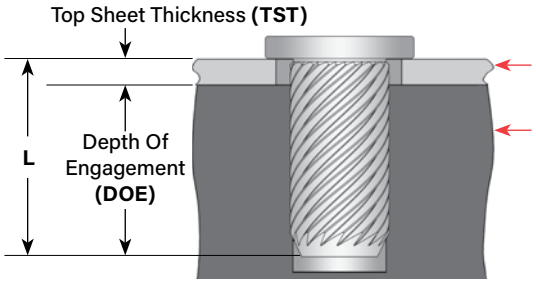


PART NUMBER DESIGNATION

TKA - 10 - xxx
TK4 - 10 - xxx

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





DOE = L - TST **DOE ≥ 0.8 mm / .0315"**

For through hole applications
DOE - 0.25 mm / .010" = Min. Sheet

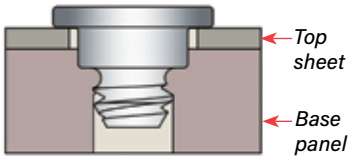
For blind hole applications
DOE + 0.25 mm / .010" = Min. Blind Hole Depth

Type		Base Panel Hole Size Code	Length Code	Top Sheet Hole Size ±0.05 mm/±.002"		Base Panel Hole Size -0.05 mm/-.002"		Top Sheet Thickness Max.		C Max.		H ±0.08 mm/ ±.003"		L ±0.06 mm/ ±.002"		T ±0.08 mm/ ±.003"		Min. Dist. Hole ℄ To Edge (1)	
Fastener Material																			
Aluminum	400 series stainless steel			mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
TKA	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.

TYPE TS4™ microPEM® TackScrew™ FASTENERS

- Simple, press-in installation for secure attachment.
- Proven self-clinching technology resists vibrational loosening.
- Replaces micro screws, eliminating installation issues including:
  - Cost of locking patch
  - Cost of threaded insert or tapped hole
  - Cost of driver bits
  - Cost of rework due to cross-threading and driver bit "cam-out"
- Top sheet can be any material.
- Can be installed automatically.
- Twists out (unscrew) if removal is necessary. Can be reinstalled one time using a thread locking adhesive.

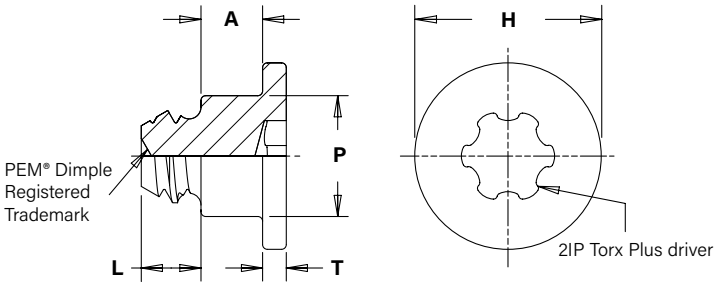


TackScrew fastener installs into blind or through hole applications.

PART NUMBER DESIGNATION

TS4 - 10 - 025

- TS4 → Type & Material
- 10 → Base Panel Hole Size Code
- 025 → Top Sheet Thickness Code

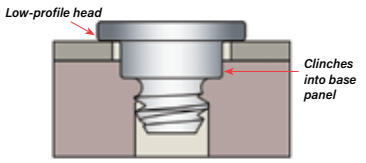


Type / Material / Hardened Stainless Steel	Base Panel Hole Size Code	Top Sheet Thickness Code	Top Sheet Thickness mm	Top Sheet Thickness in.	Base Panel Min. Sheet Thickness (1) mm	Base Panel Min. Sheet Thickness (1) in.	Top Sheet Hole Size ±0.05 mm / ±.002" mm	Top Sheet Hole Size ±0.05 mm / ±.002" in.	Base Panel Hole Size ±0.025 mm / ±.001" mm	Base Panel Hole Size ±0.025 mm / ±.001" in.	A ±0.05 mm / ±.002" mm	A ±0.05 mm / ±.002" in.	H ±0.1 mm / ±.004" mm	H ±0.1 mm / ±.004" in.	L ±0.1 mm / ±.004" mm	L ±0.1 mm / ±.004" in.	P ±0.05 mm / ±.002" mm	P ±0.05 mm / ±.002" in.	T ±0.1 mm / ±.004" mm	T ±0.1 mm / ±.004" in.	Min. Dist. Hole ℄ To Edge mm	Min. Dist. Hole ℄ To Edge 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

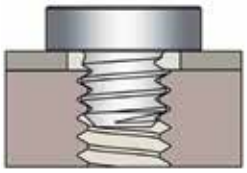
(1) Minimum sheet to prevent protrusion from through hole or minimum blind hole depth.

Comparison of TackScrew™ fastener to screw installation.

With TackScrew™ Fastener



With Screw



Typical screw related issues include costly tapping, cross-threading, torque control, and vibration back out.

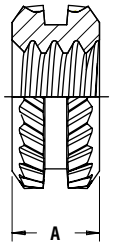
TYPE MSIB™ microPEM® INSERTS FOR PLASTICS

- Threads as small as M1.
- Designed for use in straight or tapered holes.
- Symmetrical design eliminates the need for orientation.
- Provides excellent performance in wide range of plastics.

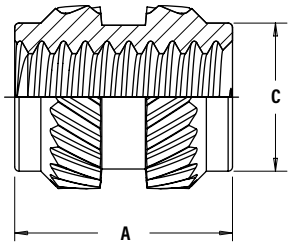
PART NUMBER DESIGNATION

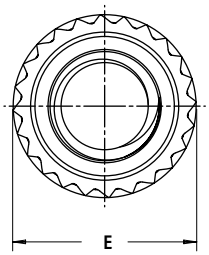
MSI	B	-	M1	-	100
↓	↓		↓		↓
Type	Material		Thread Size Code		Length Code

Style #1



Style #2





After Knurl

All dimensions are in millimeters.

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

(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.

Insert Material: Free-machining, leaded brass, plain finish

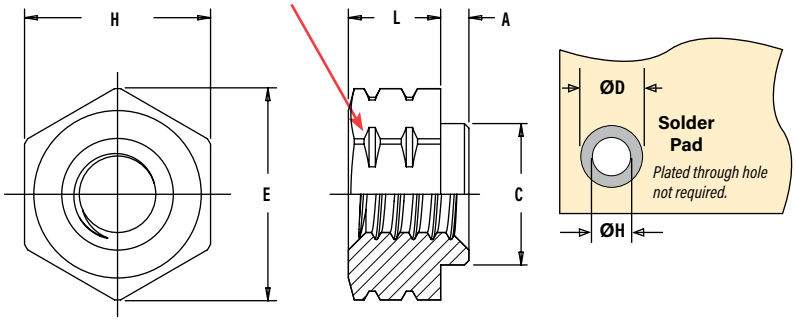
PEM® TYPE SMTSO™ microPEM® SURFACE MOUNT FASTENERS

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

PART NUMBER DESIGNATION

SMTSO	080	-	2	-	ET
↓	↓		↓		↓
Type	Thread Code		Length Code		Finish Code

Double Notch (PEM Registered Trademark)
Metric -1 length not marked



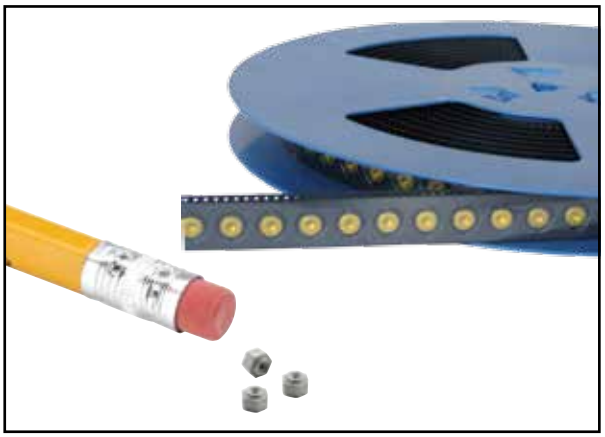
All dimensions are in inches.

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

All dimensions are in millimeters.

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

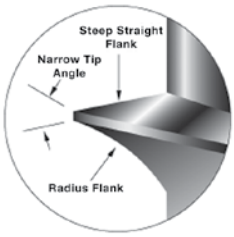


microPEM® SCREWS

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

Cost-effective, forged internal/external screw

REMFORM® SCREWS

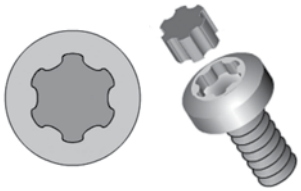


- Designed primarily for plastic applications
- Provides superior performance in a wide range of plastics
- Asymmetrical thread minimizes radial hoop stress to reduce boss bursting
- Narrow tip angle reduces stress in plastic nut member
- Suitable for other ductile materials such as wood and soft metals

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

PennEngineering is a licensee of Acument Global Technologies (Torx®, Torx Plus®), Reminc (REMFORM®, TAPTITE 2000®, FASTITE 2000®) and EJOT® (PT® and DELTA PT®).

MATERIAL AND FINISH SPECIFICATIONS

	Fastener Materials					Standard Finishes			For Use in Sheet Hardness: (1)					
Type	Carbon Steel	Age Hardened A286 Stainless Steel	Hardened 400 Series Stainless Steel	Hardened 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	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
MPP		•				•					•			
MSO4			•			•				•				
SMTSO	•						•					•		
TA				•				•	•					
T4			•			•				•				
TKA				•				•					•	
TK4			•			•							•	•
TS4			•			•				•				
MSIB					•			•					•	
Part Number Codes For Finishes						None	ET	None						

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

A NOTE ABOUT FASTENERS FOR STAINLESS STEEL PANELS

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 are offered (Types MSO4, T4, TK4 AND TS4). However, while these 400 Series fasteners install and perform well in 300 Series stainless sheets they should not be used if the end product:

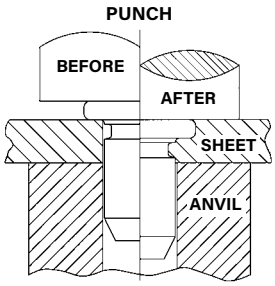
- Will be exposed to any appreciable corrosive presence.
- Requires non-magnetic fasteners.
- Will be exposed to any temperatures above 300˚F (149˚C)

If any of the these are issues, please contact techsupport@pemnet.com for other options.

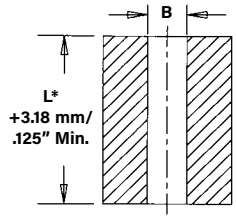
INSTALLATION

TYPE MPP

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert pin through mounting hole (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.



Recommended Installation Anvil



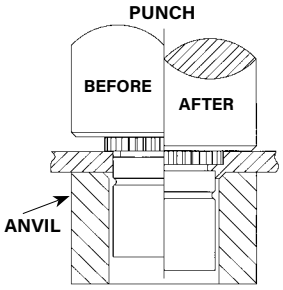
*See page 3 for "L."

PEMSERTER® Installation Tooling

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

TYPE MSO4

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert standoff through mounting hole (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.

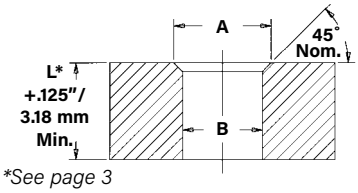


PEMSERTER® Installation Tooling

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

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

Recommended Installation Anvil



*See page 3 for "L."

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" over the minimum recommended mounting hole.
6. Fastener should not be installed adjacent to bends or other highly cold-worked areas.

INSTALLATION

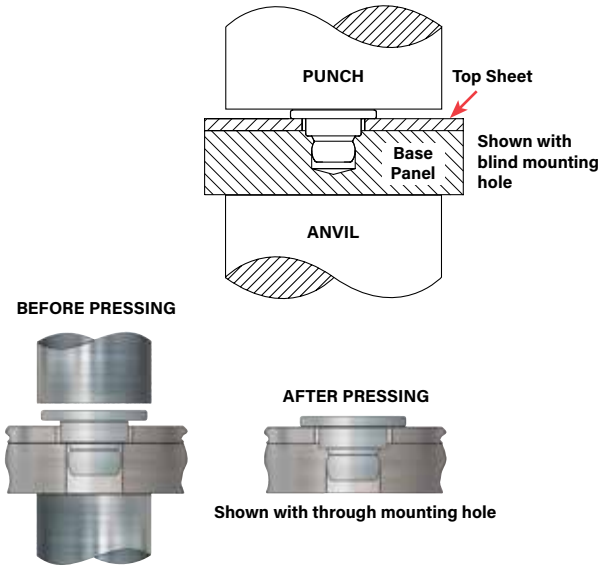
TYPE TA/T4

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 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		

microPEM® TackPin® fasteners can be installed automatically in high volume applications. Contact your nearest Engineering representative for more information.



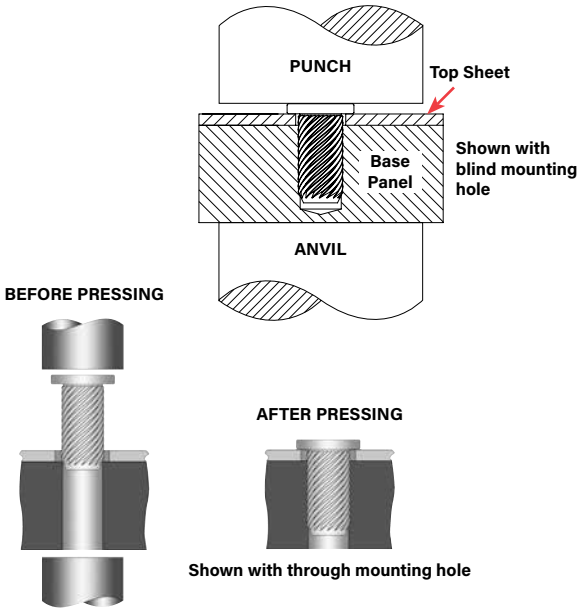
TYPES TKA/TK4

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		

microPEM® TackSert® fasteners can be installed automatically in high volume applications. Contact your nearest Engineering representative for more information.



INSTALLATION

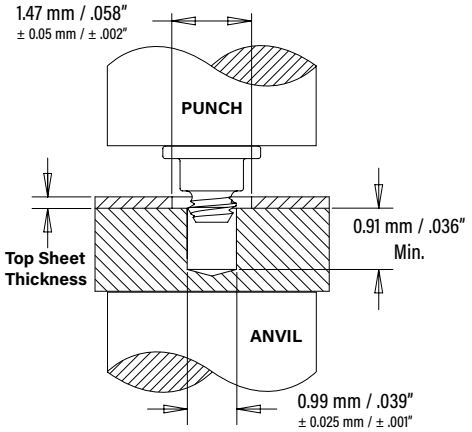
TYPE TS4

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 of base panel.
4. With punch and anvil surfaces parallel, apply squeezing force until the head of the fastener contacts the top sheet.

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.

BEFORE PRESSING

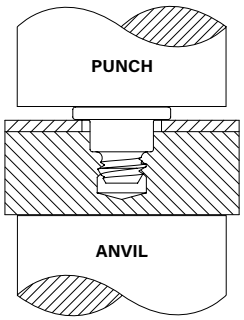


Shown with blind mounting hole.
Can also be used with a through hole.

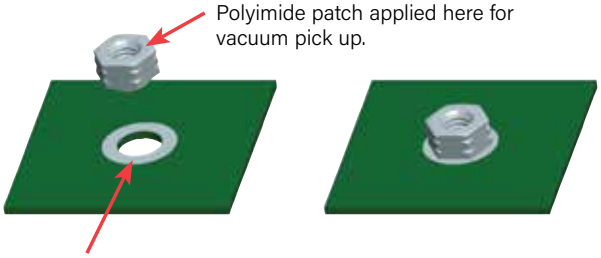
PEMSERTER® Installation Tooling

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

AFTER PRESSING



TYPE SMTSO



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(1)

TYPE MSO4

	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)
UNIFIED	MS04	080	.65	.013	2500	33	1.3	78
				.017	2500	45	2.2	
	MS04	256	1.3	.013	2500	33	2.2	110
				.017	2500	45	2.6	

	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)
METRIC	MS04	M1	0.019	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
	MS04	M1.2	0.036	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
	MS04	M1.4	0.057	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
	MS04	M1.6	0.084	0.3	11.1	150	0.15	350
				0.43	11.1	200	0.25	
	MS04	M2	0.175	0.3	11.1	150	0.25	500
				0.43	11.1	200	0.3	

TYPE MPP

Type	Pin Diameter Code	Test Sheet Thickness	Installation (kN)	Pushout (N)
MPP	1MM	0.5mm stainless steel HRB 88	10	320
MPP	1.5MM	0.5mm stainless steel HRB 88	12	760
MPP	2MM	0.5mm stainless steel HRB 88	18	860

TYPE TA

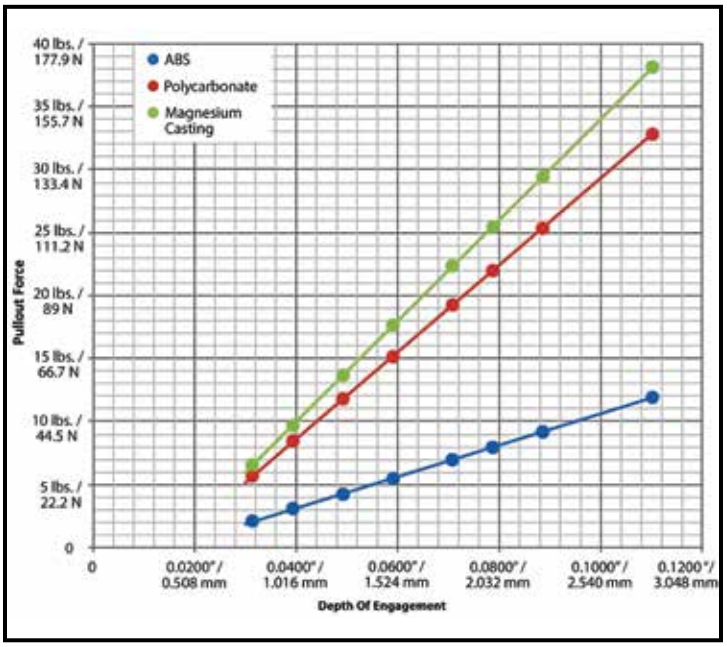
Type	5052-H34 Aluminum: Installation N	Installation lbs.	Pullout N	Pullout lbs.
TA-10-025	820	185	80	18
TA-10-050				
TA-10-075				

TYPE T4

Type	300 Series Stainless Steel: Installation N	Installation lbs.	Pullout N	Pullout lbs.
T4-10-025	2020	455	200	45
T4-10-050				

TYPES TKA/TK4

Type	Test Base Panel Material	Depth Of Engagement (mm)	Depth Of Engagement (in.)	Installation (N)	Installation (lbs.)	Pullout (N)	Pullout (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
		2.8	0.1102	245	55	53	12
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
		2.8	0.1102	423	95	146	33
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



(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.

PERFORMANCE DATA

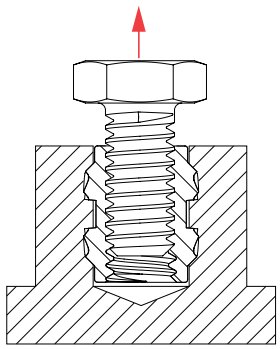
TYPE TS4

Part Number	Tested Top Sheet Thickness	5052-H34 Aluminum HRB 63 / HB 114						304 Stainless Steel HRB 89 / HB 187					
		Installation		Pullout (1)		Torque to Remove		Installation		Pullout (1)		Torque to Remove	
		N	lbs.	N	lbs.	N·cm	oz. in.	N	lbs.	N	lbs.	N·cm	oz. in.
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"												

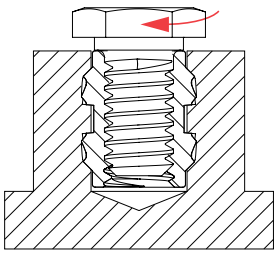
TYPE MSIB

	Type	Thread Code	Length Code	Test Sheet Material			
				ABS		Polycarbonate	
				Pullout (N)	Torque-out (N·cm) (2)	Pullout (N)	Torque-out (N·cm) (2)
METRIC	MSIB	M1	100	50	3.5	50	4.5
			250	150	10	200	12
	MSIB	M1.2	100	50	3.5	50	4.5
			250	150	10	200	12
	MSIB	M1.4	150	100	15	140	15
			300	330	30	400	30
	MSIB	M1.6	150	100	15	140	15
			300	330	30	400	30

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

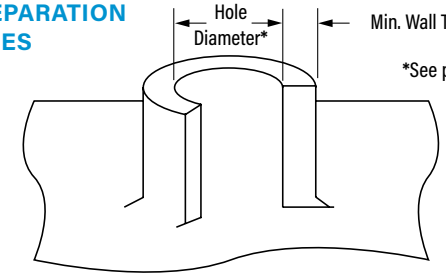


Pullout *is the force required to pull the insert from the sheet.*



Torque-out *is the torque required to turn the fastener 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.

TYPE SMTSO(3)(4)

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) Pullout after initial installation.
(2) 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.
(3) 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.
(4) Further testing details can be found in our web site's literature section.

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

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.

PennEngineering®

PEM®

North America: Danboro, PA USA • E-mail: info@pemnet.com • Tel: +1-215-766-8853 • Fax: +1-215-766-0143 • 800-237-4736 (USA Only)
Europe: Galway, Ireland • E-mail: europe@pemnet.com • Tel: +353-91-751714 • Fax: +353-91-753541
Asia/Pacific: Singapore • E-mail: singapore@pemnet.com • Tel: +65-6-745-0660 • Fax: +65-6-745-2400
Shanghai, China • E-mail: china@pemnet.com • Tel: +86-21-5868-3688 • Fax: +86-21-5868-3988

Visit our PEMNET™ Resource Center at www.pemnet.com

Technical support e-mail: techsupport@pemnet.com