# MPF™
# microPEM® Fasteners





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

**NEW!**
Type TMSO4™ standoffs install flush in sheets as thin as .008"/0.2mm.

## 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

Fastener drawings and models are available at www.pemnet.com. Custom sizes are available on special order. Contact us for more information.

### MPP™ microPEM® Self clinching Pins
Ideal for positioning and alignment applications — PAGE 3

### TMSO4™ microPEM® Self clinching Standoffs for Thin Sheets
NEW!

Installs flush into half hard .008"/0.2mm stainless steel sheets — PAGE 4

### MSO4™ microPEM® Self clinching Standoffs
Designed for mounting and/or spacing in extremely limited space applications — PAGE 5

### TA™/T4™ microPEM® TackPin® Fasteners
Enable sheet-to-sheet attachment, replacing costly screw installation in applications where disassembly is not required — PAGE 6

### TKA™/TK4™ microPEM® TackSert® Pins
Enables attachment of metal sheets to plastic, replacing costly screw installation in applications where disassembly is not required — PAGE 7

### TFA™ microPEM® Flextack™ Fasteners
Bellville washer shaped head of the microPEM® FlexTack™ fastener draws panels together to adapt to panel tolerance variations — PAGE 8

### 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 8

### CDS™ microPEM® ClampDisk® Fasteners
Press straight onto a 1 mm pin to replace threads, adhesive, rivets and other small fasteners — PAGE 9

### MSIA™/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 10

### MSOFS™ microPEM® Flaring Standoffs
Attach permanently in any type of panel, including metal, plastic and PC board. Flaring feature allows for captivation of multiple panels — PAGE 11

### SMTSO™ microPEM® Surface Mount Fasteners
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 — PAGE 12

### microPEM® Screws
Available in thread codes as small as M0.8 and lengths as short as 1 mm / .039" — PAGE 13



Custom sizes are available on special order. Contact us for more information.

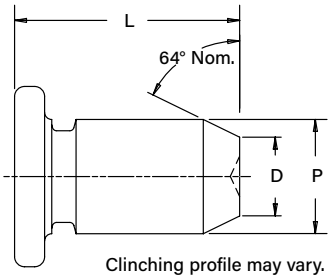
## MPP™ microPEM® Self Clinching Pins

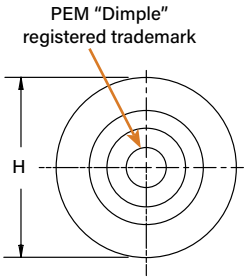
- Satisfy demanding micro positioning and alignment applications
- Head mounts flush into panels as thin as 0.5 mm / .020"
- Chamfered end makes mating hole alignment easy
- Can be installed into stainless steel sheets
- Excellent corrosion resistance
- Can be installed automatically

### Part Number Designation

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 / ±.010" | | Min. Dist. Hole C/L to Edge (6) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 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 |

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

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

## TMSO4™ microPEM® Self-Clinching Standoffs for Thin Sheets - NEW!

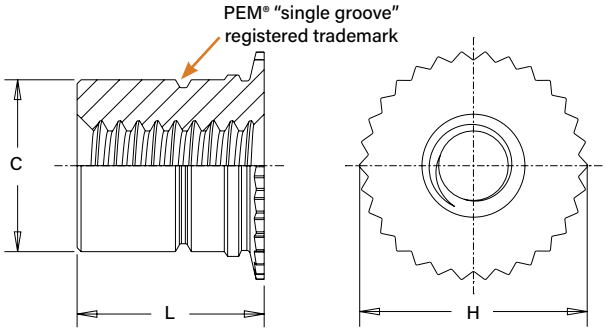
**Designed for use in harder sheets, hardness HRC 37/HB 340 or less**

- Installs flush into half hard .008"/0.2mm stainless steel sheets
- Installs into round holes without any special mounting hole preparation, eliminating adhesives and laser welding
- Allows for light weighting and optimizing designs
- Can be installed automatically

### Part Number Designation

TMSO 4 - M1 - 200

- TMSO: Type
- 4: Material Code
- M1: Thread Code
- 200: Length Code




Clinching profile may vary.

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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Unified | .060-80 (#0-80) (1) | TMSO4 | 080 | 094 | .008 | .128 | .125 | .159 | .094 | .125 |
| | | | | 125 | | | | | .125 | |
| | .086-56 (#2-56) (1) | TMSO4 | 256 | 094 | .008 | .158 | .156 | .189 | .094 | .170 |
| | | | | 125 | | | | | .125 | |

All dimensions are in millimeters.

| | Thread Size x Pitch | 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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Metric | M1 x 0.25 (2) | TMSO4 | M1 | 200 | 0.2 | 2.24 | 2.18 | 2.97 | 2 | 2.64 |
| | | | | 300 | | | | | 3 | |
| | M1.2 x 0.25 (2) | TMSO4 | M1.2 | 200 | 0.2 | 2.59 | 2.51 | 3.39 | 2 | 2.85 |
| | | | | 300 | | | | | 3 | |
| | M1.4 x 0.3 (3) | TMSO4 | M1.4 | 200 | 0.2 | 2.87 | 2.79 | 3.67 | 2 | 2.87 |
| | | | | 300 | | | | | 3 | |
| | M1.6 x 0.35 (4) | TMSO4 | M1.6 | 200 | 0.2 | 3.25 | 3.16 | 4.04 | 2 | 3.18 |
| | | | | 300 | | | | | 3 | |
| | M2 x 0.4 (4) | TMSO4 | M2 | 200 | 0.2 | 4 | 3.96 | 4.8 | 2 | 4.32 |
| | | | | 300 | | | | | 3 | |

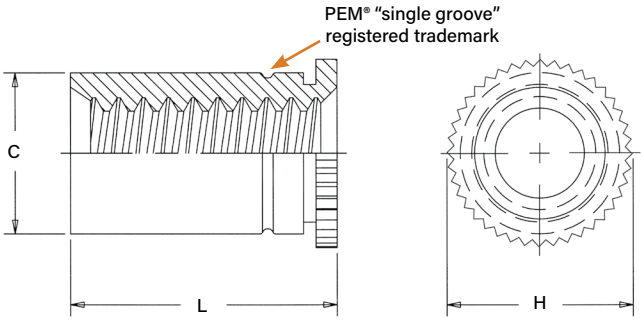
(1) Unified ASME B1.1, 2B
(2) Metric ISO 68-1, 5H
(3) Metric ISO 68-1, 6H
(4) Metric ASME B1.13M, 6H
(5) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

## 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 |
|---|---|---|---|---|---|
| Type | Material Code | | Thread Code | | Length Code |




Clinching profile may vary.

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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Unified | .060-80 (#0-80) (1) | MSO4 | 080 | 3 | .012 | .095 | .094 | .125 | .094 | .090 |
| | | | | 4 | | | | | .125 | |
| | .086-56 (#2-56) (1) | MSO4 | 256 | 3 | .012 | .125 | .124 | .156 | .094 | .120 |
| | | | | 4 | | | | | .125 | |

All dimensions are in millimeters.

| | Thread Size x Pitch | 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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|
| Metric | M1 x 0.25 (2) | MSO4 | M1 | 2 | 0.3 | 2.41 | 2.39 | 3.18 | 2 | 2.3 |
| | | | | 3 | | | | | 3 | |
| | M1.2 x 0.25 (2) | MSO4 | M1.2 | 2 | 0.3 | 2.41 | 2.39 | 3.18 | 2 | 2.3 |
| | | | | 3 | | | | | 3 | |
| | M1.4 x 0.3 (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 | |

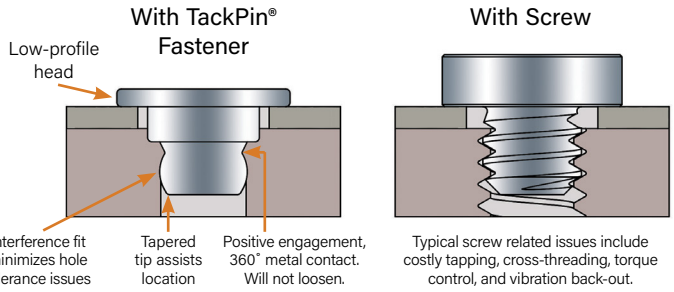
(1) Unified ASME B1.1, 2B
(2) Metric ISO 68-1, 5H
(3) Metric ISO 68-1, 6H
(4) Metric ASME B1.13M, 6H
(5) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

## 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

Patented

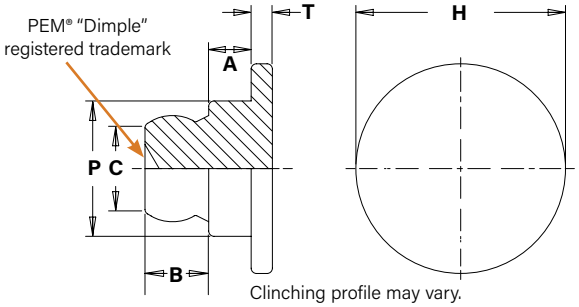
Comparison of TackPin® fastener to screw installation.



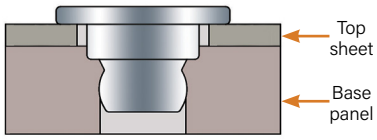

### Part Number Designation

TA - 10 - 025
T4 - 10 - 025

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




Clinching profile may vary.

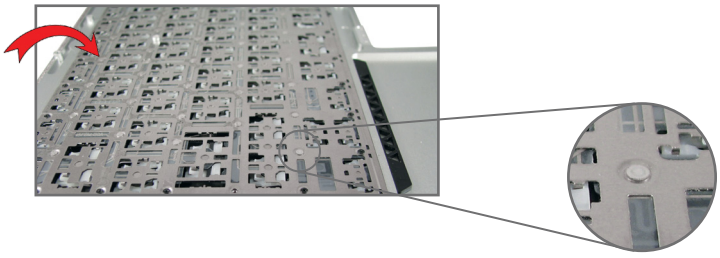



Can be installed into blind or through hole application.

| 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 C/L to Edge (2) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.
(2) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

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

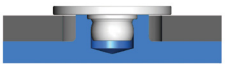
### Countersunk TackPin® Fastener

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

### Flush-head TackPin® Fastener

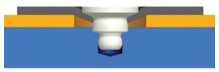
- TackPin installed into a thicker, softer top-sheet and pressed flush.

### 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

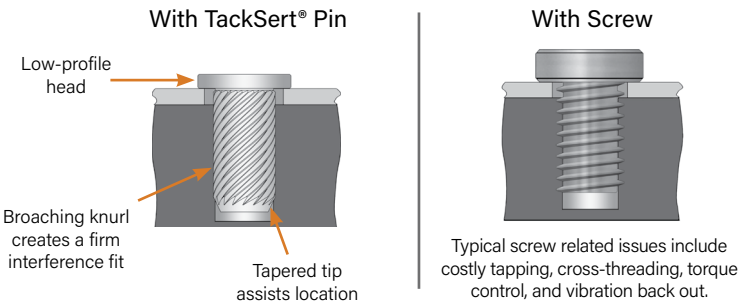


- Simple, press-in installation.
- Enables sheet-to-sheet attachment of multiple layers.
- Flush or sub-flush on both sides of sheet.
- Head mounts flush into top sheets as thin as .008"/0.2 mm.

## 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

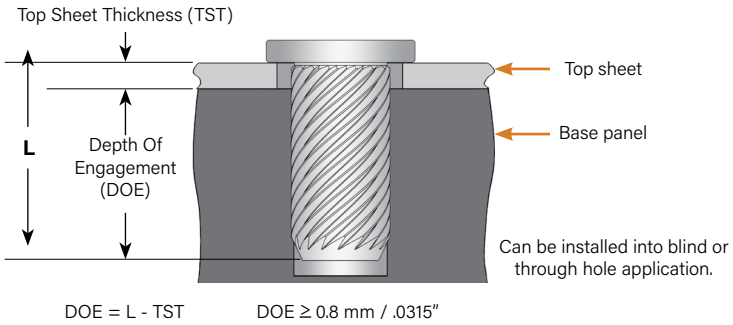
Comparison of TackSert® pin to screw installation.




### Part Number Designation

TKA – 10 – xxx
TK4 – 10 – xxx

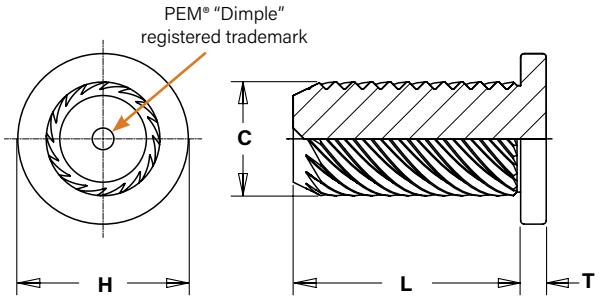
Type & Material | Base Panel Hole Size Code | Length Code




DOE = L - TST  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



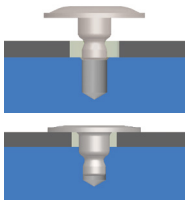

| Type | | Base Panel Hole Size Code | Length Code | Top Sheet Hole Size ±0.05 mm/±.002" | | Base Panel Hole Size -0.05 mm/-.002" | | Top Sheet Thickness Max. | | C Max. | | H ±0.08 mm/ ±.003" | | L ±0.06 mm/ ±.002" | | T ±0.08 mm/ ±.003" | | Min. Dist. Hole C/L to Edge (1) (2) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.
(2) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

## TFA™ microPEM® Flextack™ Fasteners

The Bellville washer shaped head of the microPEM® FlexTack™ fastener draws panels together to adapt to panel thickness tolerance variations.

- Alternative to using micro-screws, eliminating the need to tap or use threaded inserts.
- Installation time to simply press the part in (1.5 seconds) is less than the time to thread a screw in, equals less total installed cost.
- The Belleville-shaped head allows for stack-up tolerance relief in a design.
- Lowers overall total installed costs from the elimination of the following:
  - Cost of screw, patch to prevent loosening, threaded insert or tapped hole and driver bits
  - Cost of rework due to cross-threading or driver bit "cam-out"



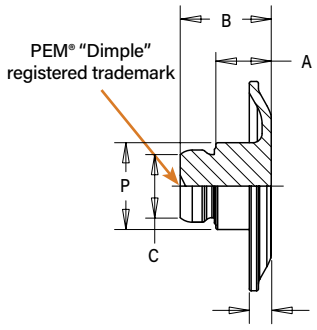
The Belleville shaped head flattens upon a simple press-in installation and draws panels together to accommodate vertical stack tolerances.

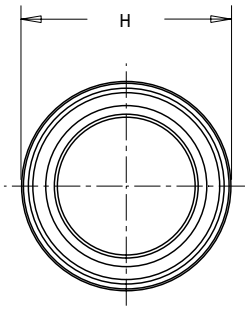
Patented

### Part Number Designation

TFA - 10 - 025

- TFA: Type & Material
- 10: Base Panel Hole Size Code
- 025: Top Sheet Thickness Code



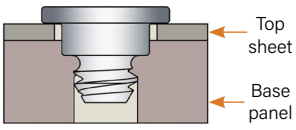

Clinching profile may vary.

| Type | 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 -0.05 mm / -.002" mm | Base Panel Hole Size -0.05 mm / -.002" in. | A ±0.04 mm / ±.0015" mm | A ±0.04 mm / ±.0015" in. | B ±0.08 mm / ±.003" mm | B ±0.08 mm / ±.003" in. | C Max. mm | C Max. in. | H ±0.1 mm / ±.004" mm | H ±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 C/L to Edge (2) mm | Min. Dist. Hole C/L to Edge (2) in. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TFA | 10 | 025 | 0.18 - 0.28 | .007 - .011 | 0.89 | .035 | 1.47 | .058 | 1.02 | .040 | 0.67 | .026 | 1.16 | .046 | 0.89 | .035 | 2.91 | .115 | 1.21 | .048 | 0.3 | .012 | 1 | .039 |
| TFA | 10 | 035 | 0.28 - 0.38 | .011 - .015 | 0.89 | .035 | 1.47 | .058 | 1.02 | .040 | 0.77 | .030 | 1.26 | .050 | 0.89 | .035 | 2.91 | .115 | 1.21 | .048 | 0.3 | .012 | 1 | .039 |
| TFA | 10 | 045 | 0.38 - 0.48 | .015 - .019 | 0.89 | .035 | 1.47 | .058 | 1.02 | .040 | 0.87 | .034 | 1.37 | .054 | 0.89 | .035 | 2.91 | .115 | 1.21 | .048 | 0.3 | .012 | 1 | .039 |
| TFA | 10 | 055 | 0.48 - 0.58 | .019 - .023 | 0.89 | .035 | 1.47 | .058 | 1.02 | .040 | 0.97 | .038 | 1.47 | .058 | 0.89 | .035 | 2.91 | .115 | 1.21 | .048 | 0.3 | .012 | 1 | .039 |

(1) 0.89 mm / .035" for blind holes and 0.5 mm / .020" for through holes.
(2) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

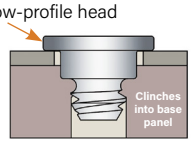
## TS4™ microPEM® TackScrew™ Fasteners

- 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

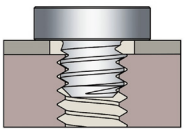



Can be installed into blind or through hole applications.

With TackScrew™ Fastener




With Screw



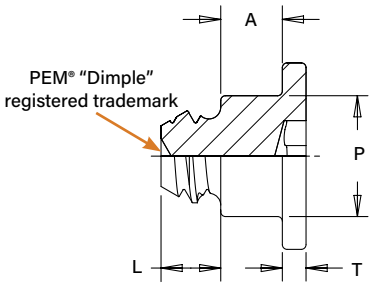
Typical screw related issues include costly tapping, cross-threading, torque control, and vibration back out

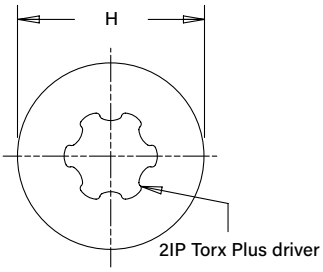
Patented

### 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 (3) mm | Base Panel Min. Sheet Thickness (3) 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 C/L to Edge (4) mm | Min. Dist. Hole C/L to Edge (4) 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 |

(3) Minimum sheet to prevent protrusion from through hole or minimum blind hole depth.
(4) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

## CDS™ microPEM® Clampdisk® Fasteners

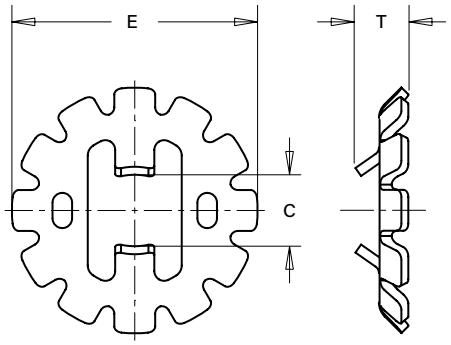
The CDS™ microPEM® ClampDisk® fastener presses straight onto a 1 mm pin to replace threads, adhesive, rivets and other small fasteners. The upward flanges of the disk grip onto the pin and prevent push-off while the downward flanges flex and generate clamp load.

- Clamp load generation
- Simple installation
- Removability
- Works with multiple panels of any material
- Limited installation stress to assemble
- Tamper resistant


Patented

### Part Number Designation

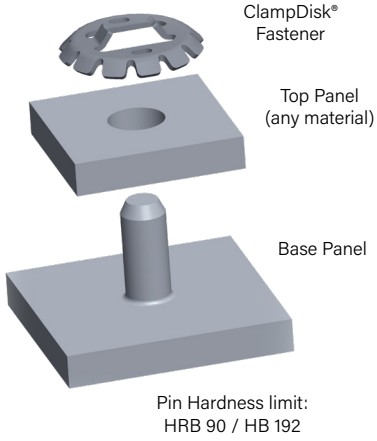
| CD | S | - | 100 |
|---|---|---|---|
| Type | Material | | Pin Diameter Code |



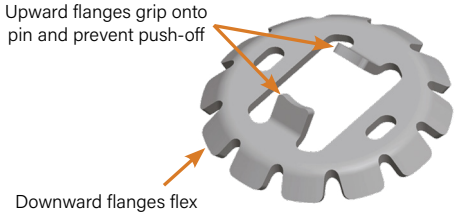

The ClampDisk® fastener can be used with a self-clinching pin. Contact techsupport@pemnet.com for information on pin material options.

All dimensions are in millimeters.

| | Type and Material | Pin Diameter Code | Pin Diameter +0.05 -0.03 | Pin Length Min. | C Nom. | E Nom. | T Nom. |
|---|---|---|---|---|---|---|---|
| Metric | CDS | 100 | 1 | 0.8 | 0.91 | 3.2 | 0.69 |




Pin Hardness limit: HRB 90 / HB 192





Ultra-small fastener is ideal for compact electronics applications.

## MSIA™/MSIB™ microPEM® Inserts For Plastics

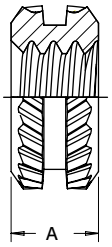
- Symmetrical design eliminates the need for orientation
- Provides excellent performance in wide range of plastics
- Aluminum inserts offer light weight, lead-free alternative

MSIB MSIA

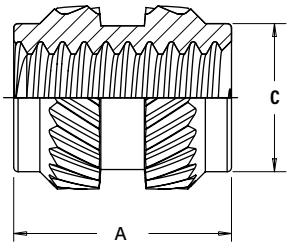
### Part Number Designation

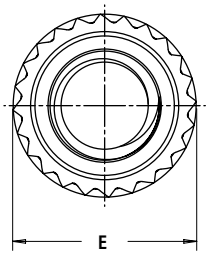
| MSI | A | – | M1 | – | 100 |
|---|---|---|---|---|---|
| ↓ | ↓ | | ↓ | | ↓ |
| Type | Material | | Thread Size Code | | Length Code |

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 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Aluminum | Brass | | | | | | Min. Wall Thickness (6) | Hole Depth Min. | Hole Diameter +0.05 |
| Metric | M1 x 0.25 (3) | MSIA | 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) | MSIA | 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) | MSIA | 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) | MSIA | MSIB | M1.6 | 150(2) | 1.5 | 2.5 | 2.15 | 0.8 | 2.27 | 2.15 |
| | | | | | 300(2) | 3 | | | | 3.77 | |
| | M2 x 0.4 (5) | MSIA | MSIB | M2 | 300(2) | 3 | 3.2 | 2.85 | 1.6 | 3.77 | 2.85 |
| | | | | | 400(2) | 4 | | | | 4.77 | |

(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.

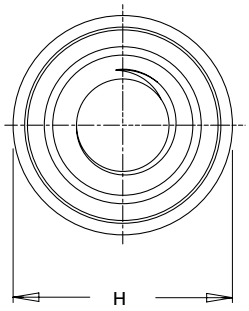
# MSOFS™ microPEM® Flaring Standoffs

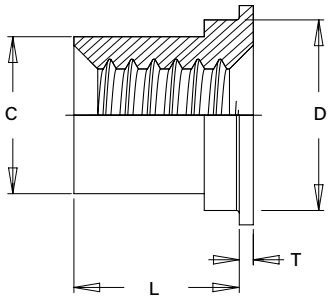
- MSOFS™ microPEM® flaring standoffs attach permanently in thin panels of any hardness, including stainless steel
- Minimum sheet thickness .008"/0.2mm of any Hardness
- Can be installed into any type or hardness of panel, including metal, plastic and PC board
- Flaring feature allows for captivation of multiple panels
- Fastener captivation method allows for reduced centerline-to-edge designs

## Part Number Designation

MSOFS - 080 - 3

- MSOFS: Type and Material
- 080: Thread Code
- 3: Length Code




All dimensions are in inches.

| | 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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unified | .060-80 (#0-80) (1) | MSOFS | 080 | 3 | .008 - .012 | .118 | .094 | .117 | .138 | .093 | .010 | .069 |
| | | | | 4 | | | | | | .125 | | |
| | .086-56 (#2-56) (1) | MSOFS | 256 | 3 | .008 - .012 | .138 | .113 | .137 | .157 | .093 | .010 | .079 |
| | | | | 4 | | | | | | .125 | | |

All dimensions are in millimeters.

| | 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 C/L to Edge (5) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metric | M1 x 0.25 (2) | MSOFS | M1 | 2 | 0.2 - 0.3 | 3 | 2.39 | 2.97 | 3.5 | 2 | 0.25 | 1.75 |
| | | | | 3 | | | | | | 3 | | |
| | M1.2 x 0.25 (2) | MSOFS | M1.2 | 2 | 0.2 - 0.3 | 3 | 2.39 | 2.97 | 3.5 | 2 | 0.25 | 1.75 |
| | | | | 3 | | | | | | 3 | | |
| | M1.4 x 0.3 (3) | MSOFS | M1.4 | 2 | 0.2 - 0.3 | 3 | 2.39 | 2.97 | 3.5 | 2 | 0.25 | 1.75 |
| | | | | 3 | | | | | | 3 | | |
| | M1.6 x 0.35 (4) | MSOFS | M1.6 | 2 | 0.2 - 0.3 | 3.5 | 2.87 | 3.48 | 4 | 2 | 0.25 | 2 |
| | | | | 3 | | | | | | 3 | | |
| | M2 x 0.4 (4) | MSOFS | M2 | 2 | 0.2 - 0.3 | 3.5 | 2.87 | 3.48 | 4 | 2 | 0.25 | 2 |
| | | | | 3 | | | | | | 3 | | |

(1) Internal, ASME B1.1, 2B
(2) Metric ISO 68-1, 5H
(3) Metric ISO 68-1, 6H
(4) Metric ASME B1.13M, 6H
(5) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

## Alternative thin sheet clinch fastener solution

Standoff for sheets
as thin as 0.1 mm

Patent pending

Contact techsupport@pemnet.com for more information.

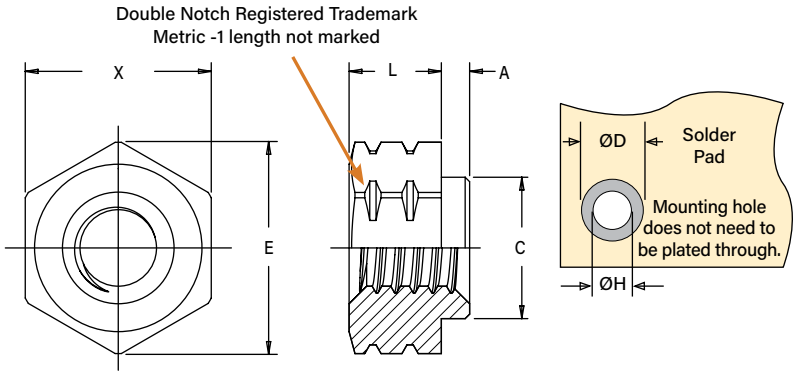
# SMTSO™ microPEM® Surface Mount Fasteners

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

## Part Number Designation

SMTSO – 080 – 2 – ET

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




All dimensions are in inches.

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unified | .060-80 (#0-80) (1) | SMTSO | 080 | 2 | .020 | .019 | .095 | .144 | .062 | .125 | .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. | L ±0.08 | X Nom. | 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 | 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 | | | |

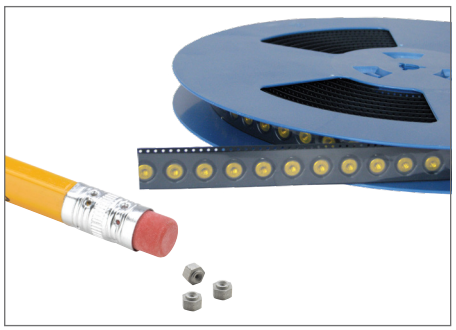
(1) Unified ASME B1.1, 2B
(2) Miniature ISO 1501, 4H6
(3) Metric ASME B1.13M, 6H

## 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 | – | – | – | – | – |

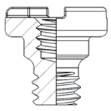
A polyimide patch is supplied to allow for reliable vacuum pickup. Fasteners are also available without a patch which may provide a lower cost alternative, depending on your installation methods/requirements.

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



Cost-effective, forged internal/external screw

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### 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

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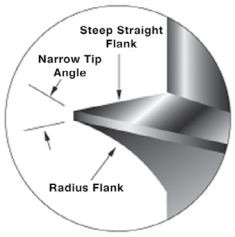
### REMFORM® Screws




- 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

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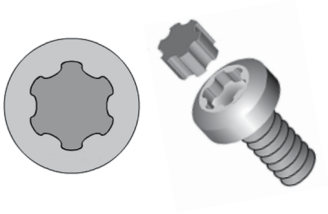
### TORX PLUS® Drive System



- 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

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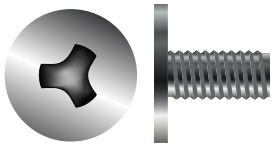
### MICROSTIX® Ultra-Thin-Head Precision Screws



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

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## Material And Finish Specifications

| | Fastener Material | | | | | | | Standard Finish [1] | | | For Use in Sheet Hardness: [2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | 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 | Electroplated Tin ASTM B 545, Class A, with Clear Preservative coating, Annealed [3] | Plain Finish | HRB 50/ HB 89 or less | HRB 88/ HB 183 or less | HRB 92/ HB 202 or less | HRC 37/ HB 340 or less | PC Board | Plastics | Castings and Brittle materials | Any Panel Material |
| MPP | | • | | | | | | • | | | | | • | | | | | |
| TMSO4 | | | | • | | | | • | | | | | | • | | | | |
| MSO4 | | | | • | | | | • | | | | • | | | | | | |
| SMTSO | • | | | | | | | | • | | | | | | • | | | |
| TA | | | | | • | | | | | • | • | | | | | | | |
| T4 | | | | • | | | | • | | | | • | | | | | | |
| TKA | | | | | • | | | | | • | | | | | • | • | | |
| TK4 | | | | • | | | | • | | | | | | | • | • | • | |
| TFA | | | | | • | | | | | • | • | | | | | | | |
| TS4 | | | | • | | | | • | | | | • | | | | | | |
| CDS | | | • | | | | | • | | | | | | | | | | •[4] |
| MSIA | | | | | | • | | | | • | | | | | | • | | |
| MSIB | | | | | | | • | | | • | | | | | | • | | |
| MFOFS | | | • | | | | | • | | | | | | | | | | • |
| Part Number Code 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.
(4) The top panel can be any material and the pin must be under a max hardness of HRB 90 / HB 192.

### 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, TMSO4, 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:

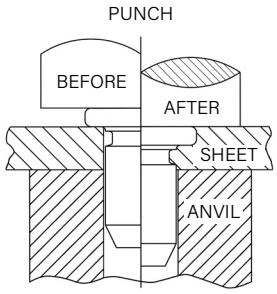
- Will be exposed to any appreciable corrosive presence
- Requires non-magnetic fasteners
- Will be exposed to any temperatures above 300˚F (149˚C)

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

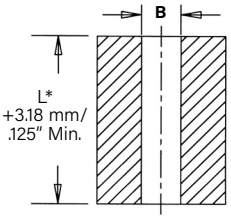



## PEMSERTER® Installation Tooling (1)

| 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 |

(1) Click here for a quote on Haeger® custom installation tooling.

Recommended Installation Anvil




*See page 3 for "L".

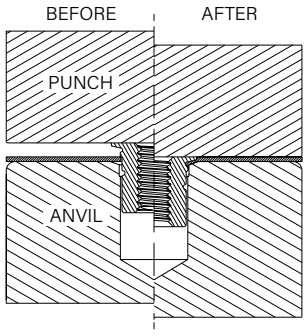
## Requirements for Installation into Stainless Steel

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. When installing fastener adjacent to bends or other highly cold-worked areas, use the C/L to edge values listed in the catalog.

## TMSO4 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.

**Note:** Haeger® and PEMSERTER® punches are spring-loaded. A spring-loaded punch is not required. However, depending on the application it may prevent warping/bending of the panel after installation.

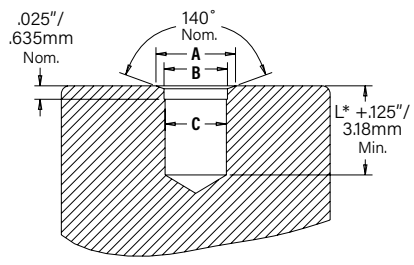



## Installation Tooling

| | Type | Thread Code | Anvil Dimensions (in.) A | B | C | HAEGER® Part Number Lower Tool | Upper Tool | PEMSERTER® Part Number Anvil | Punch |
|---|---|---|---|---|---|---|---|---|---|
| Unified | TMSO4 | 080 | .163 - .165 | .131 - .133 | .126 - .128 | H-190-080/M1.6 | H-3359 | 8026969 | 8026971 |
| | TMSO4 | 256 | .199 - .201 | .169 - .171 | .163 - .165 | H-190-256/M2 | H-3359 | 8026970 | 8026971 |

| | Type | Thread Code | Anvil Dimensions (in.) A | B | C | HAEGER® Part Number Lower Tool | Upper Tool | PEMSERTER® Part Number Anvil | Punch |
|---|---|---|---|---|---|---|---|---|---|
| Metric | TMSO4 | M1 | 3.02 - 3.07 | 2.36 - 2.41 | 2.26 - 2.31 | H-190-M1 | H-3359 | 8026966 | 8026971 |
| | TMSO4 | M1.2 | 3.45 - 3.51 | 2.69 - 2.74 | 2.59 - 2.64 | H-190-M1.2 | H-3359 | 8026967 | 8026971 |
| | TMSO4 | M1.4 | 3.73 - 3.78 | 2.97 - 3.02 | 2.87 - 2.92 | H-190-M1.4 | H-3359 | 8026968 | 8026971 |
| | TMSO4 | M1.6 | 4.14 - 4.19 | 3.33 - 3.38 | 3.20 - 3.25 | H-190-080/M1.6 | H-3359 | 8026969 | 8026971 |
| | TMSO4 | M2 | 4.88 - 4.93 | 4.13 - 4.18 | 4.04 - 4.09 | H-190-256/M2 | H-3359 | 8026970 | 8026971 |

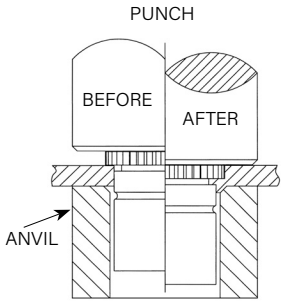
Recommended Installation Anvil



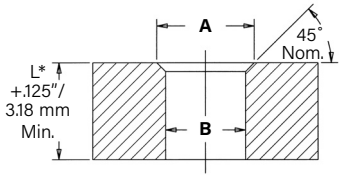

*See page 4 for "L".

## 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.




Recommended Installation Anvil




*See page 5 for "L."

### PEMSERTER® Installation Tooling (1)

| | 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 |
| | MSO4 | 256 | .142 - .144 | .127 - .129 | 8015797 | 975200997 |

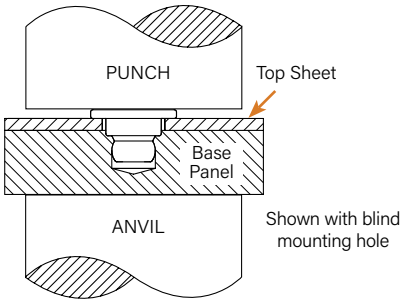
| | Type | Thread Code | Anvil Dimensions (mm) A | Anvil Dimensions (mm) B | Anvil Part Number | Punch Part Number |
|---|---|---|---|---|---|---|
| Metric | MSO4 | M1 | 2.84 - 2.89 | 2.46 - 2.51 | 8015796 | 975200997 |
| | MSO4 | M1.2 | 2.84 - 2.89 | 2.46 - 2.51 | 8015796 | 975200997 |
| | MSO4 | M1.4 | 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 |

(1) Click here for a quote on Haeger® custom installation tooling.

# Installation

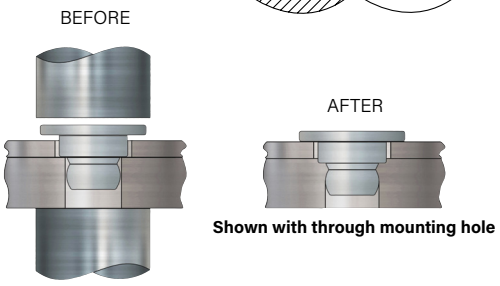
## TA/T4 Fasteners

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.




### Installation Tooling

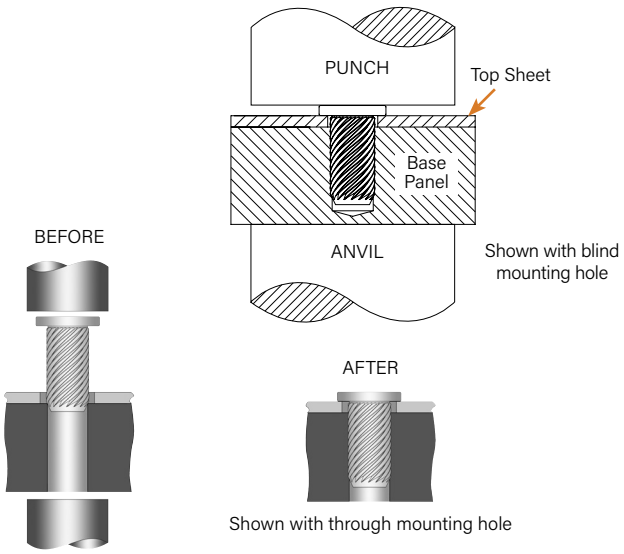
| Size | HAEGER® Part Number Anvil | HAEGER® Part Number Punch | PEMSERTER® Part Number Anvil | PEMSERTER® Part Number Punch |
|---|---|---|---|---|
| TA/TA4-10-025 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TA/TA4-10-050 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TA/TA4-10-075 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |




**Shown with through mounting hole**

## 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.

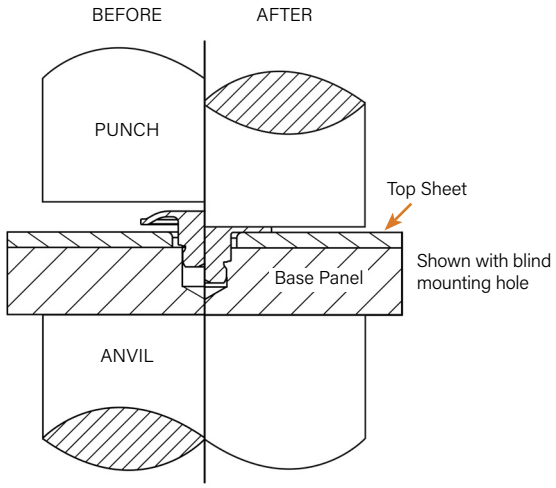



### Installation Tooling

| Size | HAEGER® Part Number | | PEMSERTER® Part Number | |
|---|---|---|---|---|
| | Anvil | Punch | Anvil | Punch |
| TKA/TK4-10-100 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TKA/TK4-10-150 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TKA/TK4-10-200 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TKA/TK4-10-250 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TKA/TK4-10-300 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |

## TFA 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 flattens and contacts the top sheet.



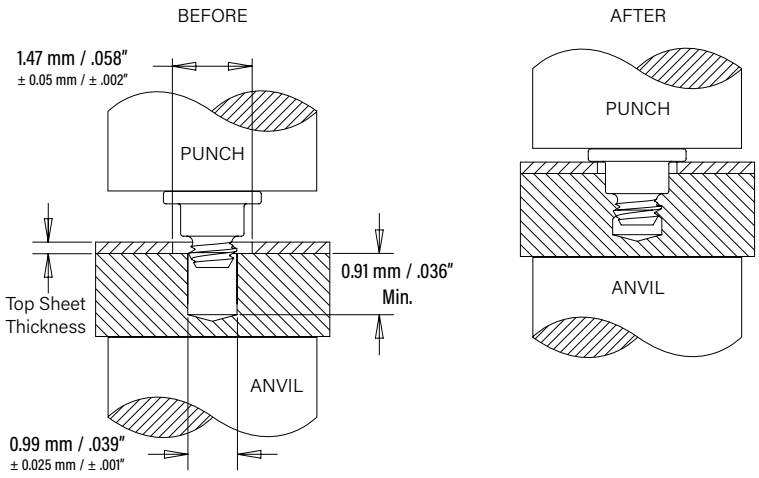

### Installation Tooling

| Size | HAEGER® Part Number | | PEMSERTER® Part Number | |
|---|---|---|---|---|
| | Anvil | Punch | Anvil | Punch |
| TFA-10-025 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TFA-10-035 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TFA-10-045 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TFA-10-055 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |

# 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.




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

## Re-installation (if necessary)

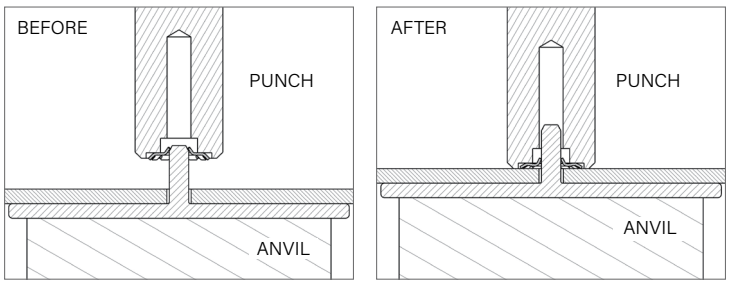
1. Place sheet and base panel in proper position.
2. Place adhesive into base panel mounting hole.
3. Place fastener through hole in top sheet and into mounting hole of base panel.
4. Screw in fastener with 2IP Torx Plus driver.

### Installation Tooling

| Size | HAEGER® Part Number | | PEMSERTER® Part Number | |
|---|---|---|---|---|
| | Anvil | Punch | Anvil | Punch |
| TS4-10-025 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |
| TS4-10-050 | H-108-0019L | H-108-0018L | 975200046 | 8014167 |

## CDS Fasteners

1. Place ClampDisk® fastener over a pin.
2. With the installation punch and anvil surfaces parallel, apply squeezing force until the punch contacts the mounting sheet. The drawings at the right indicate suggested tooling for applying these forces.



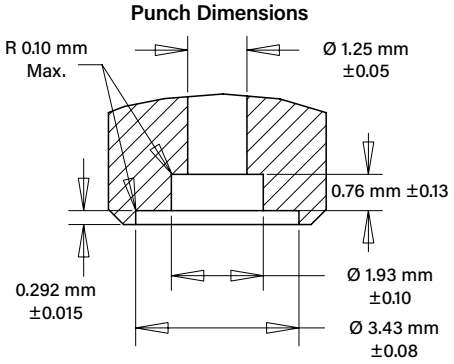

## Removal

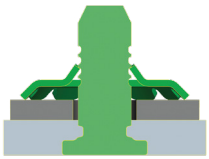
For service or maintenance, the ClampDisk® fastener can be easily removed with a sharp edge tool. For reassembly, simply install a new fastener.

## PEMSERTER® Installation Tooling (1)

| Fastener Part Number | Punch Part Number | Anvil Part Number |
|---|---|---|
| CDS-100 | 8025386 | 975200046 |

(1) Click here for a quote on Haeger® custom installation tooling.

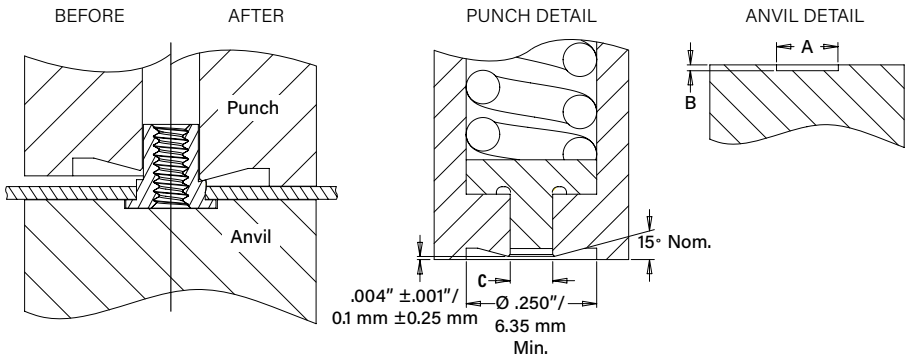


The PEM® ClampDisk® fastener can be installed onto a grooved pin for increase strength and allow installation onto any material. For more information, contact techsupport@pemnet.com.

## 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.



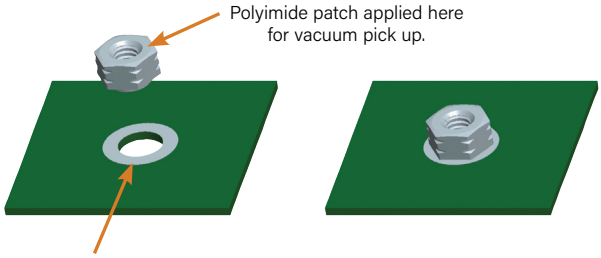

## PEMSERTER® Installation Tooling(1)

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

(1) Click here for a quote on Haeger® custom installation tooling.

| | Thread Code | Punch Dimensions (mm) C +0.025 | Punch Part Number | Anvil Dimensions (mm) A ±.025 | Anvil Dimensions (mm) B ±.025 | Anvil Part Number |
|---|---|---|---|---|---|---|
| Metric | 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.

### 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.

For Additional HAEGER® and PEMSERTER® Tooling Information/Part Numbers visit our tooling wizard

## Performance Data[1]

### TMSO4 Standoffs

| | Type | Thread Code | Test Sheet Material - .008" 304 Stainless Steel HRC 37 / HV 360 | | | |
|---|---|---|---|---|---|---|
| | | | Installation (lbs.) | Pushout (lbs.) | Torque-out (in. lbs.) | Pull-thru (lbs.) |
| Unified | TMS04 | 080 | 2600 | 30 | 4.0 [2] | 137 |
| | TMS04 | 256 | 3000 | 40 | 4.4 | 193 |

| | Type | Thread Code | Test Sheet Material - 0.2mm 304 Stainless Steel HRC 37 / HV 360 | | | |
|---|---|---|---|---|---|---|
| | | | Installation (kN) | Pushout (N) | Torque-out (N•m) | Pull-thru (N) |
| Metric | TMS04 | M1 | 8.2 | 130 | 0.07 [2] | 440 |
| | TMS04 | M1.2 | 9.9 | 130 | 0.14 [2] | 525 |
| | TMS04 | M1.4 | 11.1 | 130 | 0.21 [2] | 590 |
| | TMS04 | M1.6 | 11.6 | 130 | 0.45 [2] | 610 |
| | TMS04 | M2 | 13.4 | 175 | 0.5 | 860 |

### MSO4 Standoffs

| | Type | Thread Code | Max. Rec. Tightening Torque for Mating Screw (in. lbs.) | Sheet Thickness (in.) | Test Sheet Material - 304 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 | | 45 | 2.2 | |
| | MS04 | 256 | 1.3 | .013 | 2500 | 33 | 2.2 | 110 |
| | | | | .017 | | 45 | 2.6 | |

| | Type | Thread Code | Max. Rec. Tightening Torque for Mating Screw (N•m) | Sheet Thickness (mm) | Test Sheet Material - 304 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 | | 200 | 0.25 | |
| | MS04 | M1.2 | 0.036 | 0.3 | 11.1 | 150 | 0.15 | 350 |
| | | | | 0.43 | | 200 | 0.25 | |
| | MS04 | M1.4 | 0.057 | 0.3 | 11.1 | 150 | 0.15 | 350 |
| | | | | 0.43 | | 200 | 0.25 | |
| | MS04 | M1.6 | 0.084 | 0.3 | 11.1 | 150 | 0.15 | 350 |
| | | | | 0.43 | | 200 | 0.25 | |
| | MS04 | M2 | 0.175 | 0.3 | 11.1 | 150 | 0.25 | 500 |
| | | | | 0.43 | | 200 | 0.3 | |

### MPP Pins

| 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 |

### T4 Fasteners

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

### TA Fasteners

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

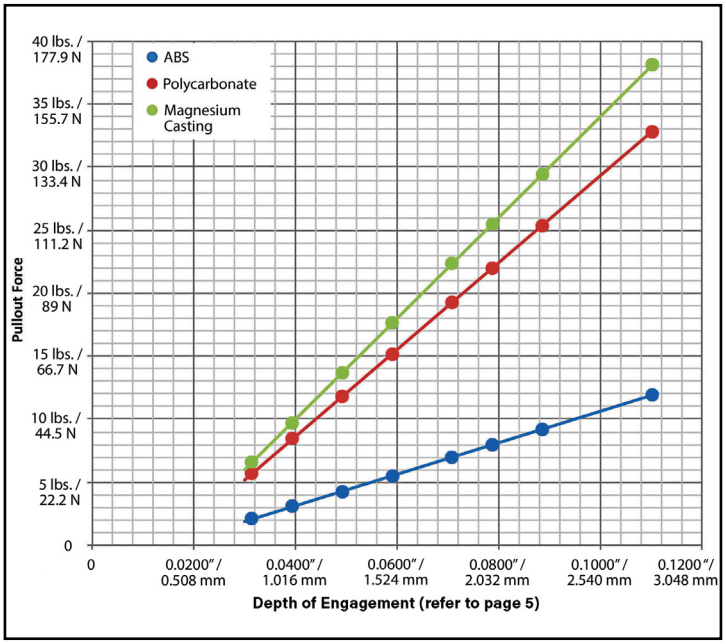
(1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and 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

## TKA/TK4 Pins

| 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 |




## TFA Fasteners

| Type | 5052-H34 Aluminum | | | |
|---|---|---|---|---|
| | Installation | | Pullout | |
| | N | lbs. | N | lbs. |
| TFA-10-025 | 450 | 101 | 40 | 9 |
| TFA-10-035 | | | | |
| TFA-10-045 | | | | |
| TFA-10-055 | | | | |

## TS4 Fasteners

| 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) | (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" | | | | | | | | | | | | |

## CDS Fasteners(2)

| Part Number | Test Pin Material | Installation (kN) (1) | Pull-off (N) | Clamp Load (N) |
|---|---|---|---|---|
| CDS-100 | 6061-T6 Aluminum | 0.33 | 18.1 | 7 |

## MSOFS Standoffs

| | 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.) (3) |
| Unified | MSOFS | 080 | .65 | 1500 | 69.8 | 1.29 |
| | MSOFS | 256 | 1.3 | 1800 | 91.2 | 1.29 |

| | 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)(3) |
| Metric | 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 |

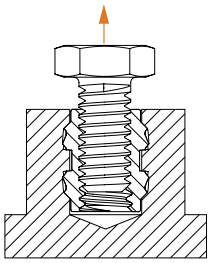
(1) Pullout after initial installation.
(2) Specially designed installation punch prevents over-installation and damage to the fastener.
(3) Torque-out performance will depend on the strength and type of screw being used. In most cases, the screw threads will fail before the insert threads.

## Performance Data

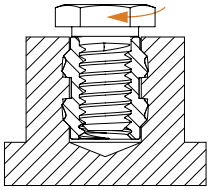
### MSIA/MSIB Inserts

| | Type | Thread Code | Length Code | Test Sheet Material | | | |
|---|---|---|---|---|---|---|---|
| | | | | ABS | | Polycarbonate | |
| | | | | Pullout (N) | Torque-out (N•cm) (1) | Pullout (N) | Torque-out (N•cm) (1) |
| Metric | 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.

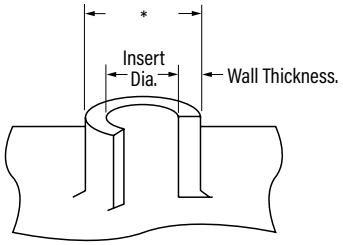


**Pullout** is the force required to pull the insert from the sheet.



**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.

* see page 10 for wall thickness and hole preparation recommendations

### SMTSO(2)(3) Fasteners

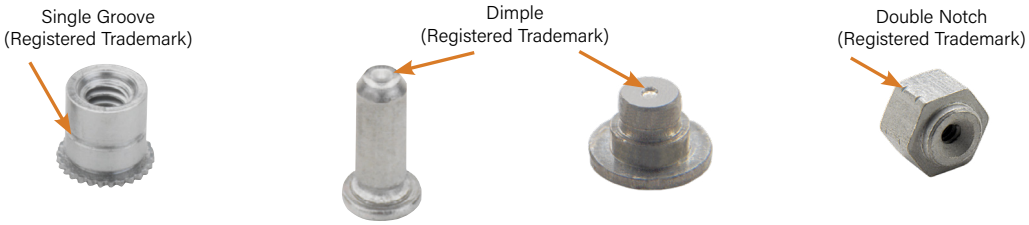
| Type and Size | Test Sheet Material .062" Single Layer RF-4 | | | |
|---|---|---|---|---|
| | Pushout (lbs.) | Pushout (N) | Torque-out (in. lbs.) | Torque-out (N•m) |
| SMTSO-080<br>SMTSO-M1<br>SMTSO-M1.2<br>SMTSO-M1.4<br>SMTSO-M1.6 | 85.1 | 378.7 | 4.94 | 0.56 |

### 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.

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



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