PEM® CONSUMER ELECTRONICS
FASTENING DESIGN STANDARDS

Discover the Difference
• Micro-sized parts available off the shelf
• One single part number, anywhere in the world
SEE HOW THE INNOVATIVE THINKING BEHIND PEM® FASTENING SOLUTIONS CAN MOVE YOU FORWARD

Consumer electronics manufacturers rely on the forward-thinking innovation and high performance of PEM® and microPEM® fasteners. You'll find our products everywhere – from laptops and virtual reality glasses to trackpads and keyboards.

PEM® brand fasteners use self-clinching, broaching, flaring, or surface mount technology for strong, reusable, and permanent threads and mounting points in different ductile/non-ductile materials.

microPEM® brand fasteners go beyond the ability of traditional micro screws – providing a thinner, lighter, stronger solution for practically any consumer electronics micro application.

With new capabilities and one of the largest and most diverse portfolios in the industry, see how you can move forward with better cost savings, reliability, and eco-friendly performance for your products.

WHY CHOOSE PEM® FASTENERS

PennEngineering® was founded on a single revolutionary product – an easy-to-install, self-clinching fastener that provides load-carrying threads in metal sheets too thin to be tapped.

Today, PEM® fasteners include hundreds of innovative products that provide hundreds of design applications – with unmatched quality, performance, and reliability.

FEWER PARTS. FEWER ASSEMBLY STEPS. FASTER TIME TO MARKET

PEM® and microPEM® fasteners attach to a sheet of ductile material by causing the material to cold-flow under pressure into an annular recess of the fastener – securely locking it into place.

Strength – Stronger threads vs. a tapped panel

In-Process Installation – Parts are installed into a plain round hole with no secondary operations required

Cost Reduction – Decreased installation cycle times with high-speed installation options

Design Flexibility – Can be installed into dissimilar metals

Clean Process – Environmentally friendly, with no weld splatter and less energy requirements

DISCOVER THE DIFFERENCE WITH PEM® AND MICROPEN® CONSUMER ELECTRONICS FASTENERS

PEM® and microPEM® solutions give you thinner, stronger, lighter fasteners – a winning combination that delivers better performance and a competitive advantage.

One Single Part Number, Anywhere in the World

We offer one single part number for each of our standard parts, making it easy for you to order while increasing product availability.

Micro-sized Parts Available Off the Shelf

Our extensive portfolio of standard parts is ready, directly off the shelf, to help you reduce your critical lead times supporting new designs.

PEMedge® Value Add Services

PEMedge® is a full suite of expert services to help you improve cost, quality, time to market, and overall performance. Services include:

Teardowns | Testing | Application Engineering | Virtual Tech Support | Master Classes.

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DESIGN ENGINEERED FOR CRITICAL CONSUMER ELECTRONICS APPLICATIONS

The complexity and reduced size of electronics products continues to grow every day, and fasteners have become a critical piece of consumer electronics architecture.

PEM® and microPEM® fasteners play a critical role in the performance of products. Whether it’s a standard catalog fastener, custom part, or total system solution, our engineering expertise makes it possible to design an innovative fastening solution for any application.

THINNER, LIGHTER, STRONGER SOLUTIONS THAT GO BEYOND THE ABILITY OF SCREWS

While traditional micro screws can hold multiple components together, they can be an expensive option when considering total installation cost.

The Tack family of fasteners are a smart alternative that can save you money and perform better than traditional screws:
- Smaller size and lighter for consumer electronics
- Designed for thinner applications and sleek cosmetic profile
- Lower total installed cost
- Better process control

TACK FAMILY OF FASTENERS

**TackPin®**
- Suitable for installation into ductile materials
- Ideal for machined aluminum or steel HRB 88 or less

**TackScrew™**
- Suitable for installation into ductile materials
- Ideal for machined aluminum or steel HRB 88 or less
- Allows for re-usability by unscrewing and reinstallation

**TackSert®**
- Suitable for installation into brittle materials
- Ideal for plastic or metal castings

**FlexTack™**
- Suitable for installation into ductile materials
- Ideal for machined aluminum HRB 50 or less
- The Belleville-shaped head allows for stack-up tolerance relief.

TackPin®, TackScrew™, FlexTack™ are patented. ClampDisk® and TackSert® are patent pending.
SEE WHAT’S POSSIBLE WITH PEM® FASTENING SOLUTIONS FOR CONSUMER ELECTRONICS

LAPTOPS

From keyboard attach to trackpads to PCB attach, PEM® fastening solutions ensure top performance.

Sample Applications
- Keyboard Attach
- Trackpad Attach
- Thin Sheet Enclosure Mounts
- PCB Attach
- Cosmetic Enclosure Standoffs

PEM® Solutions
- microPEM® TackSert® Fastener
- microPEM® TackPin® Fastener
- microPEM® Self-clinching Pins
- microPEM® Self-clinching Standoffs
- microPEM® Surface Mount Fasteners
- SI® Molded Insert
- ZackSert™ Fastener
- Internal/External Fasteners

WEARABLES

PEM® fastening solutions can be used to provide lightweight, strong attachment for wearables applications.

Sample Applications
- Vibrational Motor Attach
- PCB Mounting
- Charge Pins
- Thin Sheet Substructures
- Strong Threads for Cast Magnesium or Aluminum
- Hinge Connections
- Band and Strap Connections

PEM® Solutions
- microPEM® TackSert® Fastener
- microPEM® TackPin® Fastener
- microPEM® Self-clinching Pins
- microPEM® Surface Mount Fasteners
- SI® Molded Insert
- Internal/External Fasteners

SMART PHONES & TABLETS

From thin back enclosure standoffs to pick and place surface mount components, PEM® fasteners can save space and reduce overall weight while maintaining a strong structural joint.

Sample Applications
- PCB Attachment
- Thin Sheet Attach on Cosmetic Surfaces
- Strong Threads for Aluminum Enclosures

PEM® Solutions
- microPEM® TackSert® Fastener
- microPEM® TackPin® Fastener
- microPEM® Self-clinching Standoffs
- Internal/External Fasteners
- microPEM® Surface Mount Fasteners

INTERNET OF THINGS (IoT)

PEM® solutions deliver reliability to connectivity and telematics systems, vehicle instrumentation, audio and video components, gaming electronics, and more.

Sample Applications
- PCB Attachment
- Thin Sheet Support Substructures
- Battery Shielding
- Vibration-Resistant Speaker Mounting

PEM® Solutions
- microPEM® Self-clinching Standoffs
- microPEM® TackPin® Fastener
- Internal/External Fasteners
- microPEM® Surface Mount Fasteners
EXPERTISE TO TAKE YOU FURTHER

Not only are PEM® and microPEM® fastening solutions precisely designed and manufactured, but they’re backed by expert technical support services. So you can always be confident in our product quality and reliability.
• Application Engineering Services & Tools
• Technical Lab Services & Testing
• Prototype Development Center
• Installation Equipment Solutions
• Global Manufacturing Network

GET PEM® AND MICROPEM® PARTS AND SUPPORT ANYTIME, ANYWHERE

San Jose, USA
Danboro, USA
Winston-Salem, USA
Kunshan, China
Tokyo, Japan
Galway, Ireland

CONSUMER ELECTRONICS FASTENER CATALOG

The following pages contain our portfolio of PEM® and microPEM® fasteners for consumer electronics applications.

• One single part number, anywhere in the world
• Micro-sized parts available off-the-shelf on all standard parts

NEED INFORMATION ON A SPECIFIC PEM® FASTENER? BROWSE OUR CONSUMER ELECTRONICS CATALOG

To see our full range of fastening solutions, visit PEMnet.com.

For help with technical information or samples, call 800-342-5736 or email info@pemnet.com.
PEM® FASTENERS

The innovation behind PEM® and microPEM® fastening solutions can add significant value and cost savings to your most complex applications requirements. Our portfolio is one of the largest and most diverse in the industry.

Table of Contents
Click links below for shortcuts to information.

- PEM®/microPEM® Innovation
- Consumer Electronics Applications:
  - Laptops
  - Wearables
  - Smart Phones
  - Internet of Things (IoT)
- microPEM® Fasteners:
  - MPP™ Self-clinching Pin
  - MSO4™ Self-clinching Standoffs
  - TA™/T4™ TackPin® Fasteners
  - TS4™ TackScrew™ Fasteners
  - TKA™/TK4™ TackSert® Pins
  - TFA™ FlexTack™ Fasteners
  - CDS™ ClampDisk® Fasteners
  - MSIA™/MSIB™ SI® Inserts for Plastics
  - MSOFS™ Flaring Standoffs
- SMTSO™ Surface Mount Fasteners
- Capabilities

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

<table>
<thead>
<tr>
<th>Type &amp; Material</th>
<th>Pin Diameter Code</th>
<th>Length Code</th>
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</thead>
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<td>MPP</td>
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PEM "Dimple" registered trademark

MPP™ microPEM® SELF-CLINCHING PINS

<table>
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<tr>
<th>Hole Size</th>
<th>Min. Pin Diameter</th>
<th>Min. in Sheet D</th>
<th>Min. H Distance to Edge C/L</th>
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<td>.020</td>
<td>.035</td>
<td>.010</td>
</tr>
<tr>
<td>1.0</td>
<td>.061</td>
<td>.035</td>
<td>.010</td>
</tr>
</tbody>
</table>

Table of Contents
**MSO4™ microPEM® SELF-CLINCHING STANDOFFS**

- Designed for mounting and/or spacing in extremely limited space applications
- Can be installed into stainless steel sheets (3)
- Have stronger threads than weld standoffs because they are made from heat-treated 400 Series Stainless Steel
- Can be installed automatically

**PART NUMBER DESIGNATION**

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<td>M1.2</td>
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<td>2.39</td>
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<td>2.39</td>
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<tr>
<td>Unified ASME B1.1, 2B</td>
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<td>M1.2</td>
<td>0.35</td>
<td>2.41</td>
<td>2.39</td>
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</tbody>
</table>
| 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.

**TA™/T4™ microPEM® TACKPIN® FASTENERSS**

**Low Profile Head Provides Space Savings**

- Suitable for installation into ductile materials
- Ideal for machined aluminum or steel HRB 88 or less
- Alternative to using micro-screws, eliminating the need to tap or use threaded inserts
- Reduce installation time vs. screws
- Lowers overall total installed costs from the elimination of the following:
  - Cost of screw patch to prevent loosening
  - Threaded inserts
  - Tapped holes
  - Installation Driver Bits
  - “Rework” due to cross-threading and/or driver bit “cam-out”

**PART NUMBER DESIGNATION**

<table>
<thead>
<tr>
<th>Type &amp; Material</th>
<th>Base Panel</th>
<th>Top Sheet Thickness</th>
<th>Min. Panel Hole Size</th>
<th>Max. Sheet Thickness</th>
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<td>TA T4 10 – 025</td>
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<td>0.019-0.022</td>
<td>0.89</td>
<td>0.035</td>
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<tr>
<td>TA T4 10 – 025</td>
<td>0.71-0.79</td>
<td>0.028-0.031</td>
<td>0.89</td>
<td>0.035</td>
</tr>
</tbody>
</table>

**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
  - Holds down top panel that is free to rotate

- **Thin Sheet TackPin® Fastener**
  - TackPin installed into a thicker, softer top sheet and pressed flush.
TS4™ microPEM® TACKSCREW™ FASTENERS

Allows for Re-Usability by Unscrewing and Then Reinstallation

- Suitable for installation into ductile materials
- Ideal for machined aluminum or steel HRB 88 or less
- Low profile head provides space savings
- Alternative to using micro-screws, eliminating the need to tap or use threaded inserts
- Reduce installation time vs. screws
- Lowers overall total installed costs from the elimination of the following:
  - Cost of screw patch to prevent loosening
  - Threaded inserts
  - Tapped holes
  - Installation Driver Bits

TKA™/TK4™ microPEM® TACKSERT® PINS

Ideal for Plastic or Metal Castings

- Suitable for installation into brittle materials
- Low profile head provides space savings
- Alternative to using micro-screws, eliminating the need to tap or use threaded inserts
- Reduce installation time vs. screws
- Lowers overall total installed costs from the elimination of the following:
  - Cost of screw patch to prevent loosening
  - Threaded inserts
  - Tapped holes
  - Installation Driver Bits
  - “Rework” due to cross-threading and/or driver bit “cam-out”

### PART NUMBER DESIGNATION

#### TS4™ microPEM® TACKSCREW™ FASTENERS

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

#### TKA™/TK4™ microPEM® TACKSERT® PINS

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

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

With TackSert® Pin
- Low-profile head
- Clinches into base panel

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

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

With TackScrew® Fastener
- Low-profile head
- Can be installed into blind or through hole application.

With Screw
- Clinches into base panel

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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

### Specification Table

<table>
<thead>
<tr>
<th>PART NUMBER DESIGNATION</th>
<th>CD</th>
<th>S</th>
<th>-</th>
<th>100</th>
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### TFA™ microPEM® FLEXTACK™ FASTENERS

The Belleville-Shaped Head Allows for Stack-Up Tolerance Relief in a Design

- Suitable for installation into ductile materials
- Ideal for machined aluminum HRB 50 or less
- Low profile head provides space savings
- Alternative to using micro-screws, eliminating the need to tap or use threaded inserts
- Reduce installation time vs. a screws
- Lowers overall total installed costs from the elimination of the following:
  - Cost of screw patch to prevent loosening
  - Threaded inserts
  - Tapped holes
  - Installation Driver Bits
  - “Rework” due to cross-threading and/or driver bit “cam-out”

### Specification Table

| PART NUMBER DESIGNATION | TFA | - | 10 | - | 025 |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|

### Diagrams

- Ultra-small fastener is ideal for compact electronics applications.
- The Belleville shaped head flattens upon a simple press-in installation and draws panels together to accommodate vertical stack tolerances.

---

(1) 0.89 mm / 0.035" for blind holes and 0.5 mm / 0.020" for through holes.
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

MSOFS™ microPEM® FLARING STANDOFFS

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

## PART NUMBER DESIGNATION

### MSIA™
- Type
- Material
- Thread
- Length Code

### MSIB™
- Type
- Material
- Thread
- Length Code

All dimensions are in millimeters.

### METRIC

<table>
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<tr>
<th>Thread Size x Pitch</th>
<th>Type</th>
<th>Thread Code</th>
<th>Length Code</th>
<th>A ±0.2</th>
<th>E ±0.2</th>
<th>C Min.</th>
<th>Hole Diameter</th>
<th>Hole Depth Min.</th>
<th>Min. Wall Thickness</th>
<th>Maximum Sheet Thickness</th>
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**All dimensions are in millimeters.**

(1) Style #1 - length codes less than ISO 150
(2) Style #2 - length codes 150 and greater
(3) Metric ISO 68-1, 5H
(4) Metric ISO 68-1, 6H
(5) Metric ASME B11.3M, 6H
(6) Refers to wall thickness of boss as tested in ABS and polycarbonate.

### UNIFIED

| Thread Size | Thread Type | Thread Code | Length Code | C Max. | D Max. | H Max. | L ±0.002 ±0.003 | T ±0.002 | Hole Size in Sheet Thickness
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**All dimensions are in inches.**

(1) Internal, ASME B11.2B
(2) Metric ISO 68-1, 5H
(3) Metric ISO 68-1, 6H
(4) Metric ASME B11.3M, 6H

### PATENT PENDING

Contact techsupport@pemnet.com for more information.

Alternative thin sheet clinch fastener solutions

Standoff for sheets as thin as 0.02 mm

Standoff for sheets as thin as 0.01 mm

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SMTSO™ microPEM® SURFACE MOUNT FASTENERS

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

### UNIFIED

<table>
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<tr>
<th>Min. ØH Hole Size</th>
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<th>Thread Size Type Code</th>
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All dimensions are in inches.

### METRIC

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<th>ØD</th>
<th>Thread Size Type Code</th>
<th>Length Code</th>
<th>Min. Sheet Thickness in Sheet</th>
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All dimensions are in millimeters.

**PART NUMBER DESIGNATION**

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<th>Type</th>
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<th>Finish Code</th>
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<tbody>
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<td>2 ET</td>
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</tbody>
</table>

**CAPABILITIES**

**INTERNAL / EXTERNAL FASTENERS**

The screws are available with internal or external driver and thread size variability.
- From M1.0 Internal/M1.2 External
- Drive variability - internal cross drive or external drive
- Locking patch on external thread

**MICROSCREW**

Microscrews are optimal for compact component attachment applications where thinner sheets and wall thicknesses are used.
- Thread sizes from M0.8
- As short as 1mm
- Various materials – stainless, steel, aluminum
- Various drive types, head styles, plating options
- Locking patch

**ZACKSERT™ FASTENER**

The ZackSert™ fastener is a smart alternative for achieving a stronger fastening joint, replacing machining and tapping screw bosses, which are timely and not optimal.
- Eliminates need for machined and tapped a screw bosses
- Stronger heat-treated, stainless steel threads
- Capable of dropping into current boss geometry
- Similar automated installation process as Tack products

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

---

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

<table>
<thead>
<tr>
<th>Thread/Thread Size</th>
<th>Length Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>080</td>
<td>D8</td>
</tr>
<tr>
<td>080</td>
<td>D6</td>
</tr>
<tr>
<td>080</td>
<td>D4</td>
</tr>
<tr>
<td>080</td>
<td>D2</td>
</tr>
</tbody>
</table>

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-460.
MATERIAL AND FINISH SPECIFICATIONS

<table>
<thead>
<tr>
<th>Fastener Materials</th>
<th>Standard Finishes</th>
<th>For Use in Sheet Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) See PEM Technical Support section of our website 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.

INSTALLATIONS

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

**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.

MSO4 STANDOFFS

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

PEMSERTER® Installation Tooling

A NOTE ABOUT HARDENED 400 SERIES STAINLESS STEEL

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

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

If any of the these are issues, please contact techsupport@pemnet.com for other options.
**TA/T4 FASTENERS**

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

**PEMSERTER® Installation Tooling**

<table>
<thead>
<tr>
<th>Size</th>
<th>Manual Punch Part Number</th>
<th>Manual Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA/T4-10-025</td>
<td>8014167</td>
<td>970200046</td>
</tr>
<tr>
<td>TA/T4-10-050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA/T4-10-075</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 base panel.
4. With installation punch and anvil surfaces parallel, apply squeezing force until the pin contacts the top sheet.

**PEMSERTER® Installation Tooling**

<table>
<thead>
<tr>
<th>Size</th>
<th>Manual Punch Part Number</th>
<th>Manual Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKA/TK4-10-100</td>
<td>8014167</td>
<td>970200046</td>
</tr>
<tr>
<td>TKA/TK4-10-150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TKA/TK4-10-200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

**PEMSERTER® Installation Tooling**

<table>
<thead>
<tr>
<th>Size</th>
<th>Manual Punch Part Number</th>
<th>Manual Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFA-10-025</td>
<td>8014167</td>
<td>970200046</td>
</tr>
<tr>
<td>TFA-10-035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TFA-10-045</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 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.

**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.

**PEMSERTER® Installation Tooling**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Punch Part Number</th>
<th>Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS4-10-025</td>
<td>8014167</td>
<td>970200046</td>
</tr>
<tr>
<td>TS4-10-050</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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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.

Installation Tooling

<table>
<thead>
<tr>
<th>Punch Dimensions</th>
<th>Fastener Part Number</th>
<th>Punch Part Number</th>
<th>Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 0.30 mm Max.</td>
<td>CDS-989</td>
<td>8025039</td>
<td>975200046</td>
</tr>
<tr>
<td>Ø 0.76 mm ±0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 1.25 mm ±0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 1.63 mm ±0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Punch Dimensions

| Ø .250"/6.35 mm Min. | Ø .25/0.250"
| 0.010" ±0.001"/0.25 mm ±0.25 mm |

Installation Tooling

<table>
<thead>
<tr>
<th>Thread Code</th>
<th>Punch Dimensions (in.)</th>
<th>Fastener Part Number</th>
<th>Punch Part Number</th>
<th>Anvil Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 2.41</td>
<td>0.320372 0.320372 0.320372</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1.2 2.41</td>
<td>0.320372 0.320372 0.320372</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1.4 2.41</td>
<td>0.320372 0.320372 0.320372</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1.6 2.9</td>
<td>0.311270 0.311270 0.311270</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>M2 2.9</td>
<td>0.311270 0.311270 0.311270</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SMTSO™ FASTENERS

Polyimide patch applied here for vacuum pick up.

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.

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

<table>
<thead>
<tr>
<th>Thread Code</th>
<th>Length Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.015</td>
<td>0.015</td>
</tr>
<tr>
<td>0.0165</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.020</td>
<td>0.020</td>
</tr>
<tr>
<td>0.025</td>
<td>0.025</td>
</tr>
</tbody>
</table>

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

### MSO4 STANDOFFS

<table>
<thead>
<tr>
<th>Thread Code</th>
<th>Max. Rec. Mating Screw Force (lbs.)</th>
<th>Installation (lbs.)</th>
<th>Push-out (lbs.)</th>
<th>Pull-out (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M80 1.25</td>
<td>4500</td>
<td>200</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>M80 2.00</td>
<td>6000</td>
<td>300</td>
<td>60</td>
<td>20</td>
</tr>
</tbody>
</table>

### MPP PINS

<table>
<thead>
<tr>
<th>Type</th>
<th>Test Sheet Material</th>
<th>Installation</th>
<th>Pullout</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5mm stainless steel</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

### MSOFS STANDOFFS

<table>
<thead>
<tr>
<th>Thread Code</th>
<th>Max. Rec. Mating Screw Force (lbs.)</th>
<th>Installation (lbs.)</th>
<th>Push-out (lbs.)</th>
<th>Pull-out (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M80 1.25</td>
<td>4500</td>
<td>200</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>M80 2.00</td>
<td>6000</td>
<td>300</td>
<td>60</td>
<td>20</td>
</tr>
</tbody>
</table>

### TFA FASTENERS

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation</th>
<th>Pullout</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFA-10-025</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>TFA-10-035</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td>TFA-10-045</td>
<td>50</td>
<td>30</td>
</tr>
</tbody>
</table>

### TA FASTENERS

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation</th>
<th>Pullout</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA-10-025</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>TA-10-035</td>
<td>100</td>
<td>30</td>
</tr>
</tbody>
</table>

### T4 FASTENERS

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation</th>
<th>Pullout</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4-10-025</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>T4-10-035</td>
<td>25</td>
<td>6</td>
</tr>
</tbody>
</table>

### CDS FASTENERS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Installation Force (lbs.)</th>
<th>Pull-off (lbs.)</th>
<th>Clamp Load (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDS-1000</td>
<td>60</td>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>

---

(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-through will depend on the strength and type of screw being used. In most cases, the screw threads will fail before the insert threads.

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

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

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

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

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