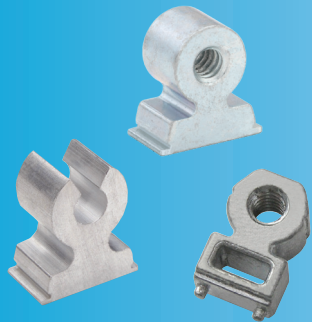


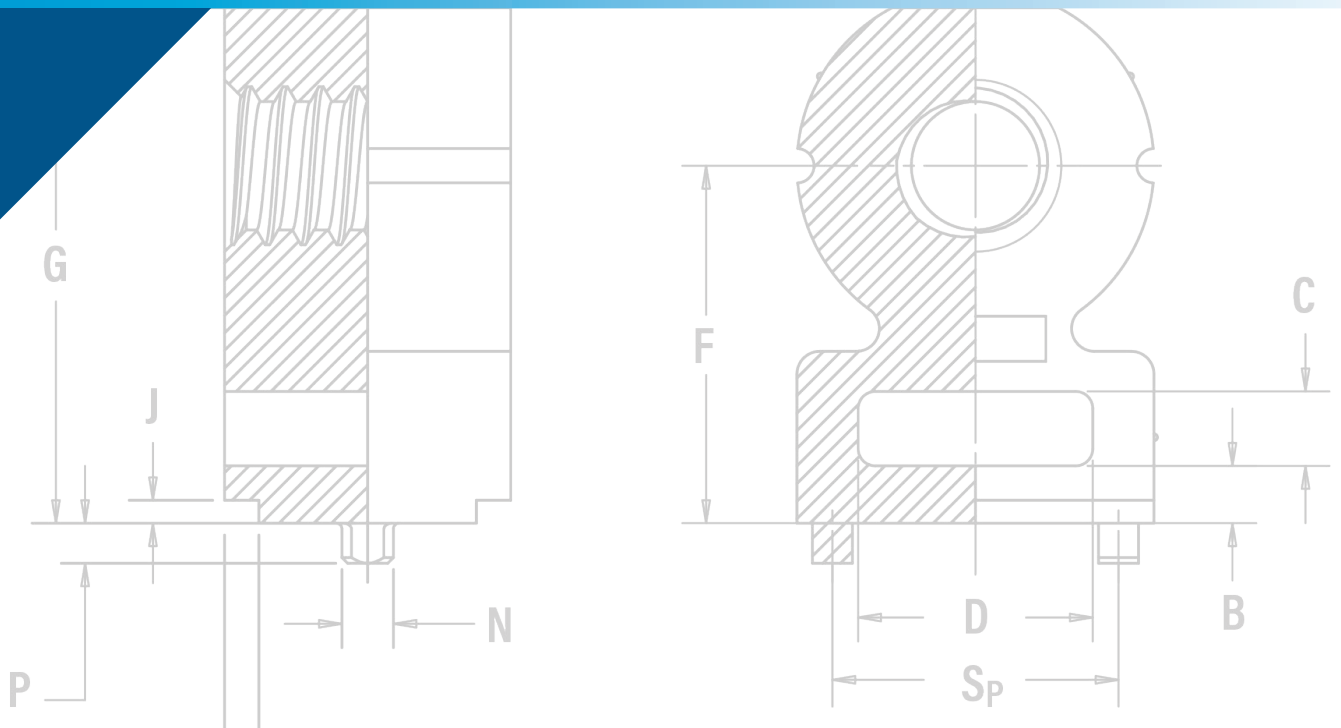


PEM® R'ANGLE® fasteners provide strong right angle attachment points in thin sheets.



**RA**<sup>TM</sup>

**RIGHT ANGLE  
FASTENERS**



# RIGHT ANGLE FASTENERS


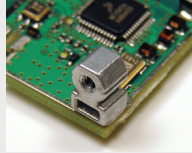
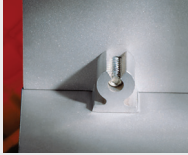
PEM® R'ANGLE® fasteners provide strong right angle attachment points in sheet metal or PC Boards. **RAA™** and **RAS™** fasteners for metal are simply pressed into a rectangular mounting hole of the proper size. **SMTRA™** fasteners are installed onto PC Boards using standard surface mount techniques. The holding power of the fastener is unaffected by the repeated tightening and loosening of the screw.

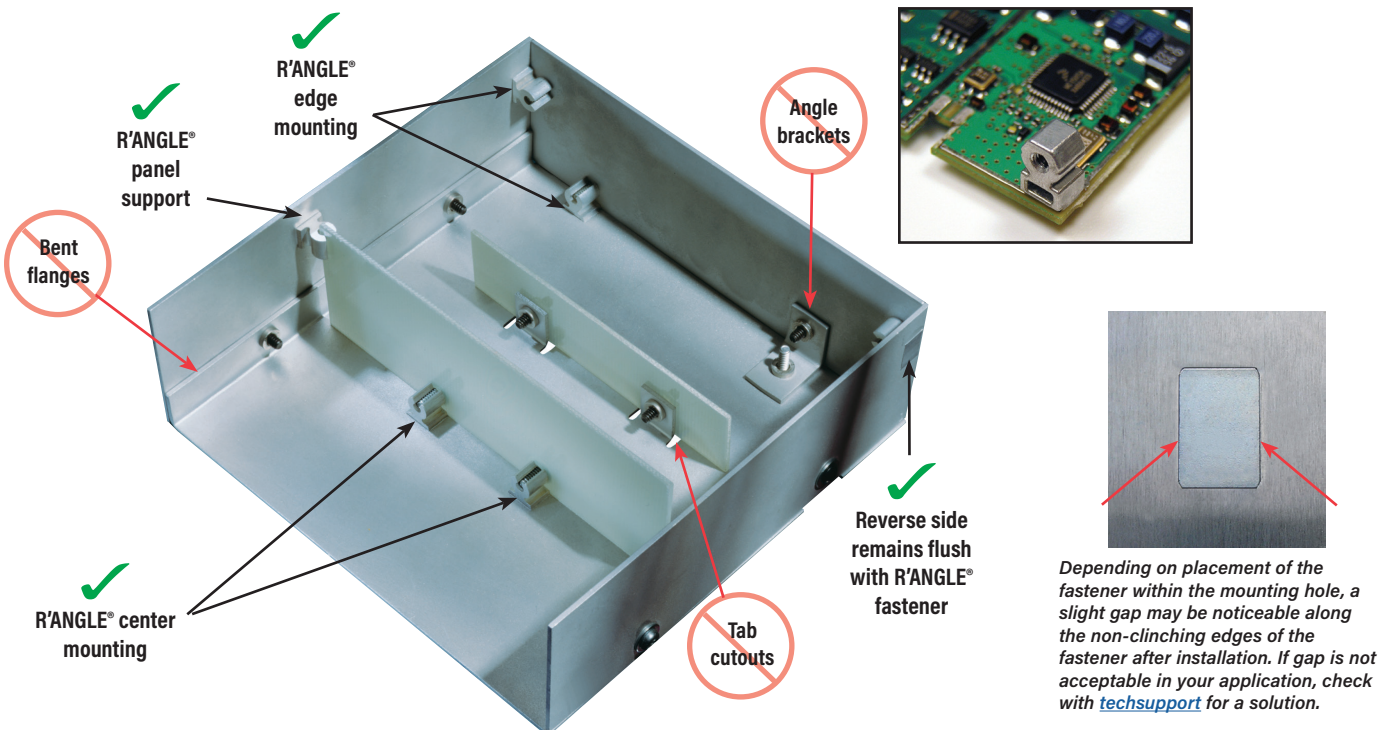
PEM® R'ANGLE® fasteners are cost-effective replacements for:

- Bent edge tabs
- Bent center tabs
- Bent flanges
- Angle brackets
- Tack welds
- Loose hardware

PEM® R'ANGLE® fasteners provide many advantages over bent tabs and flanges, including:

- More predictable designs
- Tighter design control
- Reduction of loose hardware
- Unmarred panel surfaces
- Material savings
- Improved shielding characteristics
- Fewer assembly steps

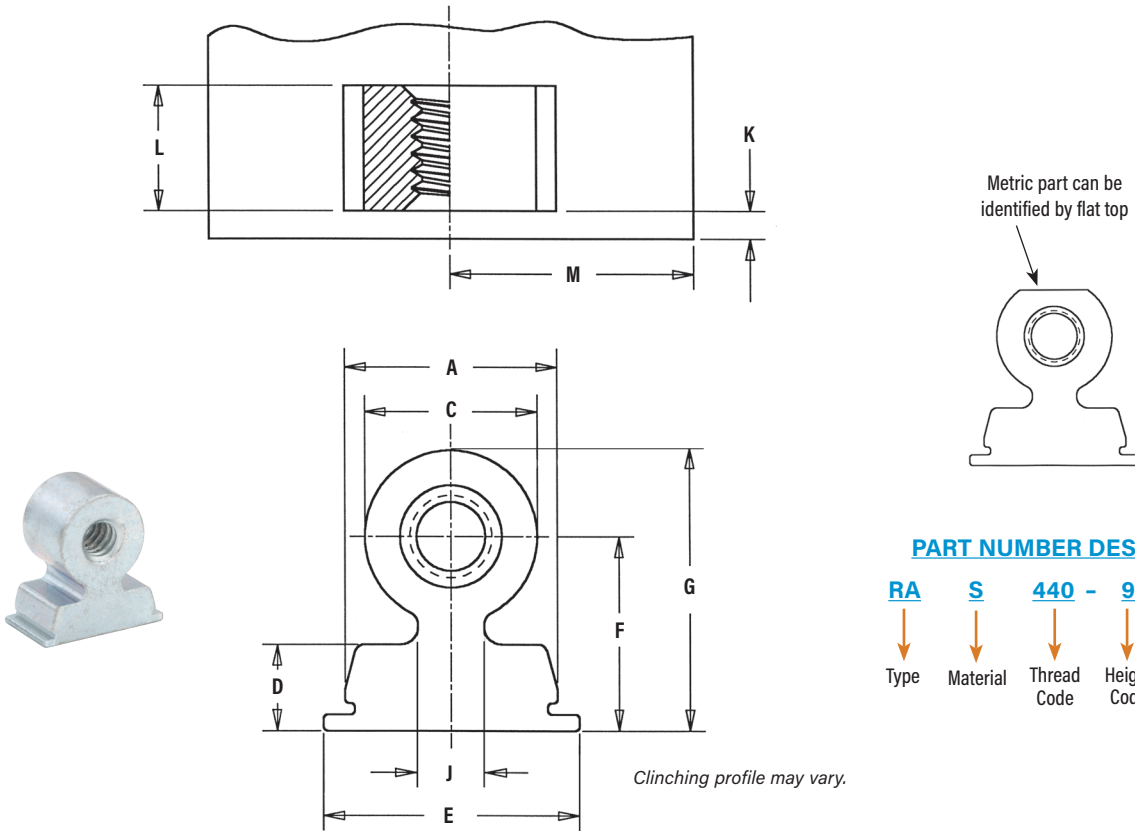
|  |  |
|--|--|
| <p><b>RAS™</b> fasteners for sheet metal is a threaded right angle fastener that accepts standard unified or metric screws - <b>PAGE 3</b></p>  | <p><b>SMTRA™</b> right angle threaded fasteners are installed on to PC Boards using standard surface mount techniques. They accept standard unified or metric screws - <b>PAGE 5</b></p>  |
| <p><b>RAA™</b> right angle fasteners for sheet metal can accept thread forming or self-tapping screws - <b>PAGE 4</b></p>                      | <p><b>Material and finish specifications - PAGE 6</b></p> <p><b>Installation - PAGES 6 - 7</b></p> <p><b>Performance data - PAGES 7 - 8</b></p>  |



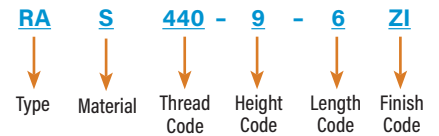
# RIGHT ANGLE FASTENERS

## PEM® RAS™ THREADED RIGHT ANGLE FASTENER

For use with standard metric or unified screws



### PART NUMBER DESIGNATION



All dimensions are in inches.

| UNIFIED            | Thread Size        | Type | Fastener Material | Thread Code | Height Code | Length Code | Length L<br>±.003 | Min. Sheet Thickness | Hole Size In Sheet<br>+.002<br>-.001 | A<br>±.003  | C<br>Nom. | D<br>Nom. | E<br>±.006 | Height F<br>±.006 | G<br>Nom. | J<br>Nom. | Min. Part Face to Edge<br>K | Min. Dist. Hole To Edge<br>M |
|--------------------|--------------------|------|-------------------|-------------|-------------|-------------|-------------------|----------------------|--------------------------------------|-------------|-----------|-----------|------------|-------------------|-----------|-----------|-----------------------------|------------------------------|
|                    | .112-40<br>(#4-40) | RA   | S                 | 440         | 9           | 4           | .121              | .040                 |                                      | .312 x .125 | .308      | .250      | .125       | .370              | .281      | .406      | .096                        | .040                         |
| 6                  |                    |      |                   |             |             | .183        | .312 x .187       |                      |                                      | .35         |           |           |            |                   |           |           |                             |                              |
| 8                  |                    |      |                   |             |             | .246        | .312 x .250       |                      |                                      | .43         |           |           |            |                   |           |           |                             |                              |
| .138-32<br>(#6-32) | RA                 | S    | 632               | 10          | 4           | .121        | .040              |                      | .375 x .125                          | .371        | .300      | .125      | .433       | .312              | .462      | .141      | .040                        | .35                          |
|                    |                    |      |                   |             | 8           | .246        |                   |                      | .375 x .250                          |             |           |           |            |                   |           |           |                             | .50                          |
|                    |                    |      |                   |             | 10          | .308        |                   |                      | .375 x .312                          |             |           |           |            |                   |           |           |                             | .55                          |
| .164-32<br>(#8-32) | RA                 | S    | 832               | 12          | 6           | .183        | .040              |                      | .406 x .187                          | .402        | .350      | .125      | .464       | .375              | .550      | .157      | .040                        | .40                          |
|                    |                    |      |                   |             | 9           | .277        |                   |                      | .406 x .281                          |             |           |           |            |                   |           |           |                             | .58                          |
|                    |                    |      |                   |             | 12          | .371        |                   |                      | .406 x .375                          |             |           |           |            |                   |           |           |                             | .65                          |

All dimensions are in millimeters.

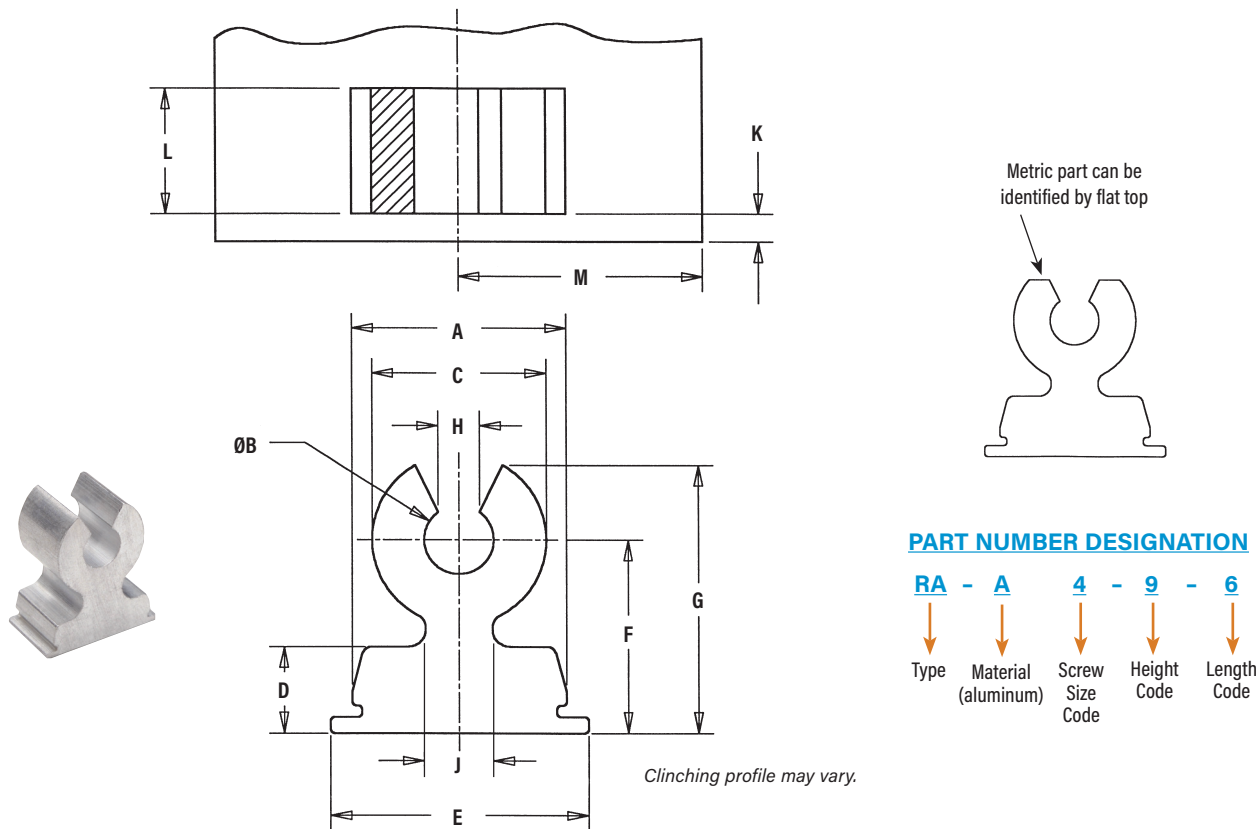
| METRIC   | Thread Size x Pitch | Type | Fastener Material | Thread Code | Height Code | Length Code | Length L<br>±0.08 | Min. Sheet Thickness | Hole Size In Sheet<br>+0.05<br>-0.03 | A<br>±0.08 | C<br>Nom. | D<br>Nom. | E<br>±0.15 | Height F<br>±0.15 | G<br>Nom. | J<br>Nom. | Min. Part Face to Edge<br>K | Min. Dist. Hole To Edge<br>M |
|----------|---------------------|------|-------------------|-------------|-------------|-------------|-------------------|----------------------|--------------------------------------|------------|-----------|-----------|------------|-------------------|-----------|-----------|-----------------------------|------------------------------|
|          | M3 x 0.5            | RA   | S                 | M3          | 7           | 3           | 2.89              | 1                    |                                      | 8 x 3      | 7.89      | 6.35      | 3.18       | 9.47              | 7         | 9.78      | 2.87                        | 1.02                         |
| 4        |                     |      |                   |             |             | 3.89        | 8 x 4             |                      |                                      | 9.1        |           |           |            |                   |           |           |                             |                              |
| 6        |                     |      |                   |             |             | 5.89        | 8 x 6             |                      |                                      | 10.7       |           |           |            |                   |           |           |                             |                              |
| M4 x 0.7 | RA                  | S    | M4                | 9           | 4           | 3.89        | 1                 |                      | 10 x 4                               | 9.89       | 8.89      | 3.18      | 11.48      | 9                 | 13.21     | 4.06      | 1.02                        | 10                           |
|          |                     |      |                   |             | 7           | 6.89        |                   |                      | 10 x 7                               |            |           |           |            |                   |           |           |                             | 14.7                         |
|          |                     |      |                   |             | 9           | 8.89        |                   |                      | 10 x 9                               |            |           |           |            |                   |           |           |                             | 16.3                         |



# RIGHT ANGLE FASTENERS

## RAA™ RIGHT ANGLE FASTENER

For use with thread forming screws



All dimensions are in inches.

| UNIFIED | Thread Form Screw Size | Type | Fastener Material | Screw Size Code | Height Code | Length Code | Length L<br>±.003 | Min. Sheet Thickness       | Hole Size In Sheet<br>+.002<br>-.001 | A<br>±.003 | ØB<br>±.004 | C<br>Nom. | D<br>Nom. | E<br>±.006 | Height F<br>±.006 | G<br>Nom. | H<br>±.007 | J<br>Nom. | Min. Part Face to Edge<br>K | Min. Dist. Hole To Edge<br>M |     |
|---------|------------------------|------|-------------------|-----------------|-------------|-------------|-------------------|----------------------------|--------------------------------------|------------|-------------|-----------|-----------|------------|-------------------|-----------|------------|-----------|-----------------------------|------------------------------|-----|
|         | #4-40                  | RA   | A                 | 4               | 9           | 6           | .183              | .040                       | .312 x .187<br>.312 x .250           | .308       | .100        | .250      | .125      | .368       | .281              | .389      | .054       | .096      | .040                        | .35                          | .36 |
|         |                        |      |                   |                 | 8           | .246        |                   |                            |                                      |            |             |           |           |            |                   |           |            |           |                             |                              |     |
| #6-32   | RA                     | A    | 6                 | 10              | 8           | .246        | .040              | .375 x .250<br>.375 x .312 | .371                                 | .123       | .300        | .125      | .431      | .312       | .442              | .066      | .141       | .040      | .50                         | .55                          |     |
|         |                        |      |                   |                 |             |             |                   |                            |                                      |            |             |           |           |            |                   |           |            |           |                             |                              |     |
| #8-32   | RA                     | A    | 8                 | 12              | 9           | .277        | .040              | .406 x .281<br>.406 x .375 | .402                                 | .145       | .350        | .125      | .462      | .375       | .525              | .078      | .157       | .040      | .58                         | .65                          |     |
|         |                        |      |                   |                 |             |             |                   |                            |                                      |            |             |           |           |            |                   |           |            |           |                             |                              |     |

All dimensions are in millimeters.

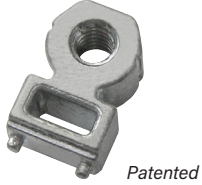
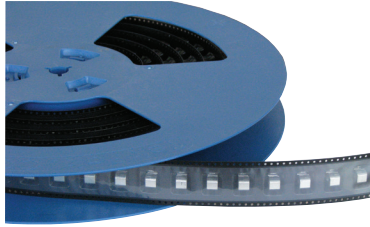
| METRIC   | Thread Form Screw Size | Type | Fastener Material | Screw Size Code | Height Code | Length Code | Length L<br>±0.08 | Min. Sheet Thickness | Hole Size In Sheet<br>+0.05<br>-0.03 | A<br>±0.08 | ØB<br>±0.1 | C<br>Nom. | D<br>Nom. | E<br>±0.15 | Height F<br>±0.15 | G<br>Nom. | H<br>±0.18 | J<br>Nom. | Min. Part Face to Edge<br>K | Min. Dist. Hole To Edge<br>M |
|----------|------------------------|------|-------------------|-----------------|-------------|-------------|-------------------|----------------------|--------------------------------------|------------|------------|-----------|-----------|------------|-------------------|-----------|------------|-----------|-----------------------------|------------------------------|
|          | M3 x 0.5               | RA   | A                 | M3              | 7           | 4           | 3.89              | 1                    | 8 x 4<br>8 x 6                       | 7.89       | 2.77       | 6.35      | 3.18      | 9.42       | 7                 | 9.27      | 1.5        | 2.87      | 1.02                        | 9.1                          |
|          |                        |      |                   |                 |             |             |                   |                      |                                      |            |            |           |           |            |                   |           |            |           |                             |                              |
| M4 x 0.7 | RA                     | A    | M4                | 9               | 7           | 6.89        | 1                 | 10 x 7<br>10 x 9     | 9.89                                 | 3.68       | 8.89       | 3.18      | 11.43     | 9          | 12.19             | 1.97      | 4.06       | 1.02      | 14.7                        | 16.3                         |
|          |                        |      |                   |                 |             |             |                   |                      |                                      |            |            |           |           |            |                   |           |            |           |                             |                              |



# RIGHT ANGLE FASTENERS

## SMTRA™ ReelFast® RIGHT ANGLE FASTENERS

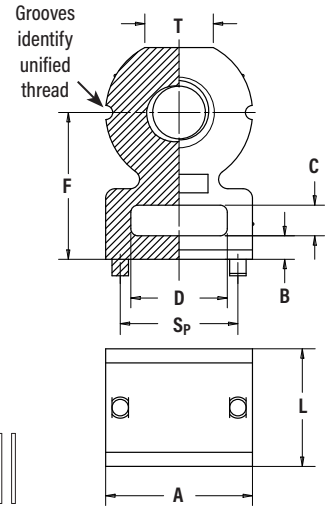
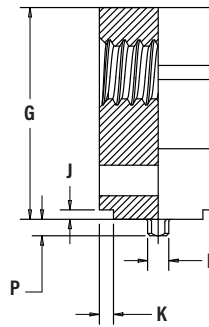
Surface mounted and threaded to accept standard unified or metric screw



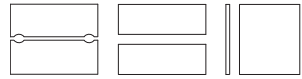
### PART NUMBER DESIGNATION

SMTRA - 256 - 8 - 6 ET

↓ Type and Material (zinc die cast)  
 ↓ Thread Code  
 ↓ Height Code  
 ↓ Length Code  
 ↓ Finish Code



### Stencil Masking Examples



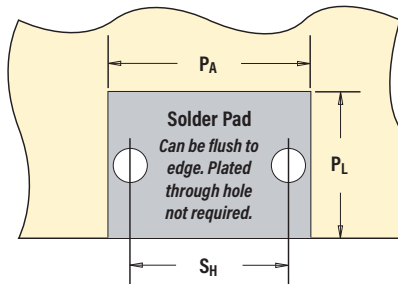
All dimensions are in inches.

| UNIFIED         | Thread Size     | Type  | Thread Code | Height Code | Length Code | Length L ±.005 | Min. Sheet Thickness | Hole Size In Sheet +.003 -.000 | A ±.006 | B ±.006 | C ±.006 | D ±.006 | Height F ±.006 | G ±.006 | J Nom. | K Nom. | N Max. | P Max. | Sp ±.003 | T Nom. |
|-----------------|-----------------|-------|-------------|-------------|-------------|----------------|----------------------|--------------------------------|---------|---------|---------|---------|----------------|---------|--------|--------|--------|--------|----------|--------|
|                 | .086-56 (#2-56) | SMTRA | 256         | 8           | 6           | .188           | .040                 | .053                           | .218    | .040    | .060    | .140    | .250           | .345    | .020   | .030   | .048   | .040   | .157     | .105   |
| .112-40 (#4-40) | SMTRA           | 440   | 9           | 6           | .188        | .040           | .053                 | .250                           | .050    | .065    | .160    | .281    | .390           | .020    | .030   | .048   | .040   | .188   | .125     |        |
| .138-32 (#6-32) | SMTRA           | 632   | 10          | 8           | .250        | .040           | .053                 | .312                           | .050    | .065    | .205    | .312    | .450           | .020    | .030   | .048   | .040   | .250   | .145     |        |
| .164-32 (#8-32) | SMTRA           | 832   | 12          | 9           | .281        | .040           | .053                 | .375                           | .050    | .075    | .250    | .375    | .535           | .020    | .030   | .048   | .040   | .312   | .195     |        |

All dimensions are in millimeters.

| METRIC      | Thread Size x Pitch | Type  | Thread Code | Height Code | Length Code | Length L ±0.13 | Min. Sheet Thickness | Hole Size In Sheet +0.08 | A ±0.15 | B ±0.15 | C ±0.15 | D ±0.15 | Height F ±0.15 | G ±0.15 | J Nom. | K Nom. | N Max. | P Max. | Sp ±0.08 | T Nom. |
|-------------|---------------------|-------|-------------|-------------|-------------|----------------|----------------------|--------------------------|---------|---------|---------|---------|----------------|---------|--------|--------|--------|--------|----------|--------|
|             | M2 x 0.4            | SMTRA | M2          | 6           | 5           | 5              | 1                    | 1.35                     | 5.5     | 1       | 1.5     | 3.5     | 6              | 8.4     | 0.5    | 0.75   | 1.22   | 1      | 4        | 2.65   |
| M2.5 x 0.45 | SMTRA               | M25   | 6           | 5           | 5           | 1              | 1.35                 | 5.5                      | 1       | 1.5     | 3.5     | 6       | 8.4            | 0.5     | 0.75   | 1.22   | 1      | 4      | 2.65     |        |
| M3 x 0.5    | SMTRA               | M3    | 7           | 5           | 5           | 1              | 1.35                 | 6.35                     | 1.25    | 1.65    | 4       | 7       | 9.75           | 0.5     | 0.75   | 1.22   | 1      | 4.75   | 3.2      |        |
| M4 x 0.7    | SMTRA               | M4    | 9           | 7           | 7           | 1              | 1.35                 | 9.53                     | 1.25    | 1.65    | 6.35    | 9       | 13.1           | 0.5     | 0.75   | 1.22   | 1      | 7.9    | 4.8      |        |

| UNIFIED | Thread Code | Pad Width PA Min. | Pad Length PL Min. | Hole Spacing SH ±.002 | Hole Size In Sheet +.003 -.000 |
|---------|-------------|-------------------|--------------------|-----------------------|--------------------------------|
|         | 256         | .262              | .171               | .157                  | .053                           |
| 440     | .294        | .171              | .188               | .053                  |                                |
| 632     | .356        | .233              | .250               | .053                  |                                |
| 832     | .419        | .264              | .312               | .053                  |                                |



| Part Number   | Parts Per Reel | Pitch (mm) | Tape Width (mm) |
|---------------|----------------|------------|-----------------|
| SMTRA256-8-6  | 375            | 16         | 24              |
| SMTRA440-9-6  | 300            | 16         | 24              |
| SMTRA632-10-8 | 200            | 20         | 32              |
| SMTRA832-12-9 | 200            | 20         | 32              |
| SMTRAM2-6-5   | 375            | 16         | 24              |
| SMTRAM25-6-5  | 375            | 16         | 24              |
| SMTRAM3-7-5   | 300            | 16         | 24              |
| SMTRAM4-9-7   | 200            | 20         | 32              |

| METRIC | Thread Code | Pad Width PA Min. | Pad Length PL Min. | Hole Spacing SH ±0.05 | Hole Size In Sheet +0.08 |
|--------|-------------|-------------------|--------------------|-----------------------|--------------------------|
|        | M2          | 6.62              | 4.57               | 4                     | 1.35                     |
| M25    | 6.62        | 4.57              | 4                  | 1.35                  |                          |
| M3     | 7.47        | 4.57              | 4.75               | 1.35                  |                          |
| M4     | 10.65       | 6.57              | 7.9                | 1.35                  |                          |



If desired, space can be used for fast cable tie mounting.





## MATERIAL AND FINISH SPECIFICATIONS

| Type                           | Threads                                 | Fastener Materials |       |               | Standard Finishes <sup>(1)</sup>                          |         |  | For Use In Sheet Hardness: <sup>(2)</sup> |                         |          |
|--------------------------------|---|--------------------|-------|---------------|---|---------|--|---|-------------------------|----------|
|                                | Internal, ASME B1.1, 2B ASME B1.13M, 6H | Aluminum           | Steel | Zinc Die Cast | Zinc Plated per ASTM B633, SCl (5µm), Type III, Colorless | Natural | Electro-plated Tin ASTM B 545, Class A with Clear Preservative Coating, Annealed | HRB 45 / HB 84 or Less                    | HRB 60 / HB 107 or Less | PC Board |
| RAS                            | ▪                                       |                    | ▪     |               | ▪   |         |  |   | ▪                       |          |
| RAA                            |   | ▪                  |       |               |   | ▪       |  | ▪   |                         |          |
| SMTRA                          | ▪                                       |                    |       | ▪             |   |         | ▪  |   |                         | ▪        |
| Part Number Codes for Finishes |   |                    |       |               | ZI  | None    | ET <sup>(3)</sup>  |   |                         |          |

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

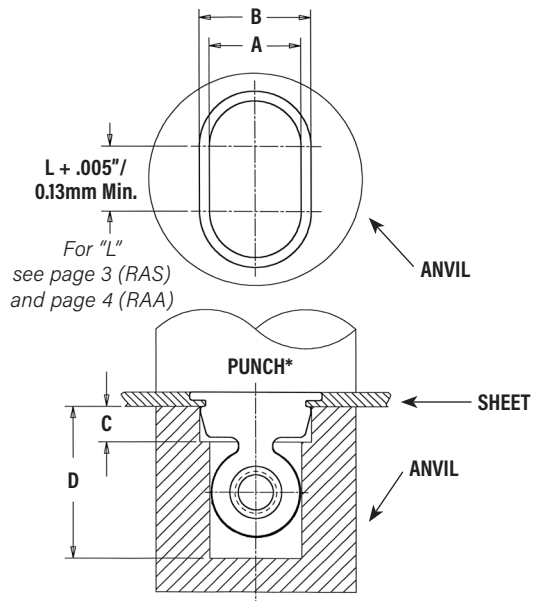
(2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

(3) Optimal solderability life noted on packaging.

## INSTALLATION

### RAS™ and RAA™ Fasteners

1. Prepare a properly sized rectangular mounting hole in the sheet. Do not perform any secondary operations such as deburring.
2. Place the fastener through the mounting hole (preferably the punch side) and into the anvil as shown in the drawing to the right.
3. With the installation punch and anvil surfaces parallel, apply a squeezing force until the bottom of the fastener becomes flush with the sheet.



\* NOTE: The punch must be large enough to cover the entire base of the fastener to ensure proper installation.

Installation tooling is available from PennEngineering.

### PEMSERTER® Installation Tooling

| UNIFIED | Screw or Thread Size Code | Anvil Dimensions (in.) |         |         |        | Anvil Part Number | Punch Part Number |
|---------|---------------------------|------------------------|---------|---------|--------|-------------------|-------------------|
|         |                           | A ±.001                | B ±.001 | C ±.005 | D Min. |                   |                   |
|         | 4 / 440                   | .257                   | .313    | .100    | .425   | 8002711           | 8003076           |
|         | 6 / 632                   | .307                   | .376    | .100    | .500   | 8002712           |                   |
|         | 8 / 832                   | .357                   | .407    | .100    | .575   | 8003642           |                   |

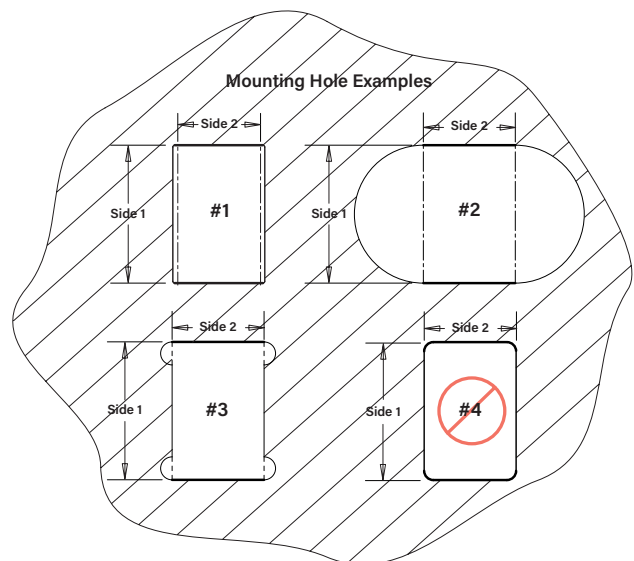
| METRIC | Screw or Thread Size Code | Anvil Dimensions (mm) |         |        |        | Anvil Part Number | Punch Part Number |
|--------|---------------------------|-----------------------|---------|--------|--------|-------------------|-------------------|
|        |                           | A ±0.03               | B ±0.03 | C ±0.1 | D Min. |                   |                   |
|        | M3                        | 6.53                  | 8.02    | 2.54   | 10.8   | 8002713           | 8003076           |
|        | M4                        | 9.07                  | 10.03   | 2.54   | 12.7   | 8002714           |                   |

### MOUNTING HOLE EXAMPLES

The mounting hole is defined by two dimensions. The two thick lines shown must be straight for the entire length defined by "Side 2" and must be separated by the distance shown as "Side 1" (Side 1 and Side 2 are the two dimensions given for the mounting hole on pages 3 and 4). The illustration shows three examples (#1, #2, and #3) of how it can be achieved. Example #4 in the lower right side will not work.

#### INSTALLATION NOTES

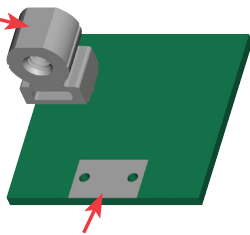
- For best results we recommend using a HAEGER® or PEMSERTER® machine for installation of PEM® self-clinching fasteners. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process [for this product](#).



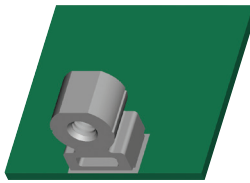
# RIGHT ANGLE FASTENERS

## SMTRA™ SURFACE MOUNT FASTENERS

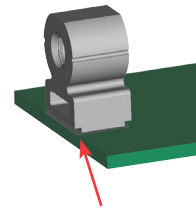
Flat top for vacuum pick up.



Solder paste applied to pad on PCB.



Solder fastener in place using standard surface mount techniques.



Undercut to accept solder fillet and permit flush to edge installation.

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

### RAS™ THREADED FASTENERS

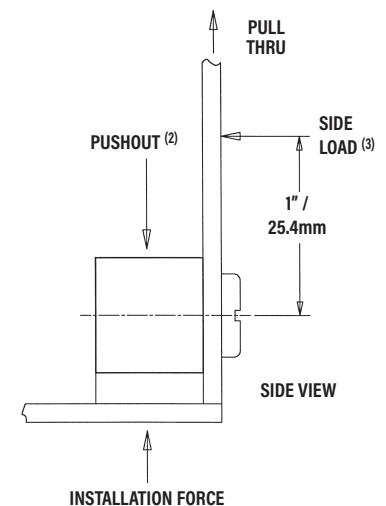
| UNIFIED | Thread Code | Height Code | Length Code | Test Sheet Material                    |                     |                    |                      |                  |  |                     |                    |                      |                  |
|---------|-------------|-------------|-------------|--|---------------------|--------------------|----------------------|------------------|--|---------------------|--------------------|----------------------|------------------|
|         |             |             |             | 5052-H34 Aluminum                      |                     |                    |                      |                  | Cold-rolled Steel                      |                     |                    |                      |                  |
|         |             |             |             | Max. Rec. Tightening Torque (in. lbs.) | Installation (lbs.) | Pushout (lbs.) (2) | Side Load (lbs.) (3) | Pull Thru (lbs.) | Max. Rec. Tightening Torque (in. lbs.) | Installation (lbs.) | Pushout (lbs.) (2) | Side Load (lbs.) (3) | Pull Thru (lbs.) |
| 440     | 9           | 4           | 13          | 1800                                   | 100                 | 7                  | 80                   | 16               | 2400                                   | 180                 | 9                  | 80                   |                  |
|         |             | 6           | 17          | 1800                                   | 145                 | 8                  | 80                   | 17               | 2400                                   | 260                 | 9                  | 80                   |                  |
|         |             | 8           | 17          | 2100                                   | 180                 | 13                 | 80                   | 17               | 3000                                   | 315                 | 15                 | 80                   |                  |
| 632     | 10          | 4           | 20          | 2000                                   | 100                 | 7                  | 85                   | 20               | 2500                                   | 190                 | 9                  | 85                   |                  |
|         |             | 8           | 21          | 2500                                   | 190                 | 12                 | 85                   | 26               | 3200                                   | 335                 | 16                 | 85                   |                  |
|         |             | 10          | 21          | 2800                                   | 230                 | 16                 | 85                   | 26               | 4000                                   | 385                 | 20                 | 85                   |                  |
| 832     | 12          | 6           | 20          | 2400                                   | 140                 | 15                 | 100                  | 27               | 3200                                   | 260                 | 11                 | 100                  |                  |
|         |             | 9           | 23          | 3300                                   | 195                 | 16                 | 100                  | 29               | 4200                                   | 345                 | 20                 | 100                  |                  |
|         |             | 12          | 30          | 3500                                   | 260                 | 20                 | 100                  | 35               | 4700                                   | 420                 | 27                 | 100                  |                  |

| METRIC | Thread Code | Height Code | Length Code | Test Sheet Material               |                   |                 |                   |               |                                   |                   |                 |                   |               |
|--------|-------------|-------------|-------------|-----------------------------------|-------------------|-----------------|-------------------|---------------|-----------------------------------|-------------------|-----------------|-------------------|---------------|
|        |             |             |             | 5052-H34 Aluminum                 |                   |                 |                   |               | Cold-rolled Steel                 |                   |                 |                   |               |
|        |             |             |             | Max. Rec. Tightening Torque (N-m) | Installation (kN) | Pushout (N) (2) | Side Load (N) (3) | Pull Thru (N) | Max. Rec. Tightening Torque (N-m) | Installation (kN) | Pushout (N) (2) | Side Load (N) (3) | Pull Thru (N) |
| M3     | 7           | 3           | 1.47        | 8                                 | 423               | 36              | 356               | 2.26          | 10.7                              | 778               | 40              | 356               |               |
|        |             | 4           | 1.92        | 8                                 | 534               | 36              | 356               | 2.71          | 10.7                              | 1001              | 40              | 356               |               |
|        |             | 6           | 2.15        | 9.3                               | 756               | 58              | 356               | 2.71          | 13.3                              | 1312              | 67              | 356               |               |
| M4     | 9           | 4           | 2.15        | 8.9                               | 556               | 53              | 423               | 3.28          | 11.6                              | 956               | 44              | 423               |               |
|        |             | 7           | 2.6         | 13.3                              | 890               | 76              | 423               | 4.07          | 16                                | 1512              | 80              | 423               |               |
|        |             | 9           | 2.83        | 13.3                              | 1112              | 93              | 423               | 4.52          | 18.7                              | 1846              | 116             | 423               |               |

### RAA™ FASTENERS

| UNIFIED | Screw Size Code | Height Code | Length Code | Thread Forming Torque (in. lbs.) | Max. Rec. Tightening Torque (in. lbs.) | Test Sheet Material | Installation (lbs.) | Pushout (lbs.) (2) | Side Load (lbs.) (3) | Pull Thru (lbs.) |
|---------|-----------------|-------------|-------------|----------------------------------|--|---------------------|---------------------|--------------------|----------------------|------------------|
|         |                 |             |             |                                  |  |                     |                     |                    |                      |                  |
| 6       | 10              | 8           | 4           | 10                               | 5052-H34 Aluminum                      | 1800                | 180                 | 13                 | 80                   |                  |
|         |                 | 8           | 5.5         | 11                               |  | 2500                | 175                 | 12                 | 85                   |                  |
| 8       | 12              | 10          | 5.5         | 17                               | 5052-H34 Aluminum                      | 2500                | 235                 | 16                 | 85                   |                  |
|         |                 | 9           | 6.5         | 18                               |  | 3100                | 205                 | 13                 | 105                  |                  |
|         |                 | 12          | 8.0         | 20                               | Aluminum                               | 3100                | 255                 | 21                 | 105                  |                  |

| METRIC | Screw Size Code | Height Code | Length Code | Thread Forming Torque (N-m) | Max. Rec. Tightening Torque (N-m) | Test Sheet Material | Installation (kN) | Pushout (N) (2) | Side Load (N) (3) | Pull Thru (N) |
|--------|-----------------|-------------|-------------|-----------------------------|-----------------------------------|---------------------|-------------------|-----------------|-------------------|---------------|
|        |                 |             |             |                             |                                   |                     |                   |                 |                   |               |
| M4     | 9               | 6           | .23         | 1.02                        | 5052-H34 Aluminum                 | 7.1                 | 756               | 44              | 356               |               |
|        |                 | 7           | .56         | 2.26                        |                                   | 13.3                | 890               | 76              | 423               |               |
|        |                 | 9           | .56         | 2.83                        | Aluminum                          | 13.3                | 1045              | 107             | 423               |               |



(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) Pushout test is conducted without side panel attached to R'ANGLE® fastener.

(3) 1" / 25.4mm from screw centerline.



## PERFORMANCE DATA

### SMTRA™ R'ANGLE® FASTENERS WITH ET FINISH<sup>(1)(2)</sup>

| UNIFIED | Part Number   | Pullout (lbs.) | Side Load (lbs.) |
|---------|---------------|----------------|------------------|
|         | SMTRA256-8-6  | 51.7           | 7.1              |
|         | SMTRA440-9-6  | 89.5           | 10.8             |
|         | SMTRA632-10-8 | 110.3          | 8.4              |
|         | SMTRA832-12-9 | 137.2          | 21.2             |

| METRIC | Part Number  | Pullout (N) | Side Load (N) |
|--------|--------------|-------------|---------------|
|        | SMTRAM2-6-5  | 418.2       | 56.8          |
|        | SMTRAM25-6-5 | 216.5       | 36.9          |
|        | SMTRAM3-7-5  | 257.6       | 41.3          |
|        | SMTRAM4-9-7  | 369.3       | 73.3          |

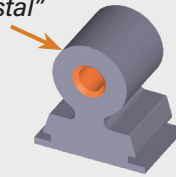
#### TESTING CONDITIONS

|                       |   |
|-----------------------|---|
| <b>Oven</b>           | Quad ZCR convection oven with 4 zones                   |
| <b>Vias</b>           | None  |
| <b>High Temp</b>      | 518°F / 270°C   |
| <b>Board Finish</b>   | 62% Sn, 38% Pb  |
| <b>Paste</b>          | Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305)<br>Lead-free |
| <b>Board</b>          | .062" thick, Single Layer FR-4                          |
| <b>Stencil</b>        | .0067" / 0.17 mm thick                                  |
| <b>Screen Printer</b> | Ragin Manual Printer                                    |

- (1) 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.
- (2) Further testing details can be found in the literature section on our website.

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