

PennEngineering®

SPOTFAST® FASTENERS



BULLETIN **SF**



SPOTFAST® FASTENERS

Allows permanent joining in metal to metal and metal to PCB/plastic panels

- Alternative to riveting and welding.
- No special installation equipment required.
- Flush or subflush on both sides.
- Minimal space requirements.
- No countersinking or other hole treatment required.
- Can be installed blind into bottom (panel 2) sheet.
- Can be concealed with paints and powder coatings.



SpotFast fasteners shown actual size.

The PEM® SpotFast® self-clinching fastener creates a permanent, flush joining of two sheets. The RoHS-compliant fasteners install smooth with the top sheet, and flush or sub-flush with the bottom sheet. Squeezing the fastener into place causes a cold-flow of panel material into the fastener's two separate clinch profiles. Type SF, SFP, and SFW fasteners can attach two metal sheets too thin to weld; fasten sheets of unequal thicknesses; join dissimilar metals unable to be welded; and even attach ultra-thin metal sections.

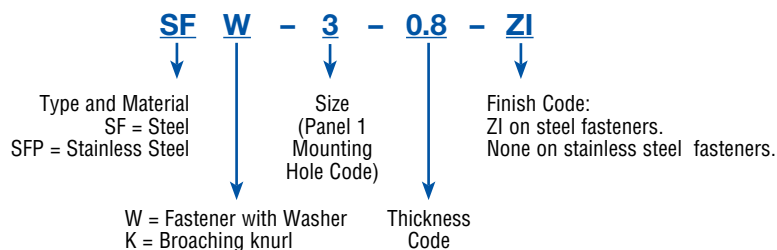
Unlike rivets that “bulb” during installation, the ultimately flush profile of SpotFast fasteners allows for unobtrusive attachment requiring minimal space. A smooth surface is retained for finishing and fasteners can be concealed easily with paints or powder coatings.

Type SFP fasteners are made from precipitation hardened stainless steel for installation into stainless steel sheets where corrosion resistance may be required.

Type SFW is specifically designed to allow pivoting of two sheets of metal. A wave washer provides the consistent torsion to allow repeatable rotation.

Type SFK fasteners create a permanent, flush joining of metal to PCB/plastic panels. The fastener has two separate joining profiles. Squeezing the fastener into place causes a cold-flow of the metal panel material into the fastener's clinch profile and a broaching fit of the knurl into the PC Board or plastic panel.

PART NUMBER DESIGNATION



SPOTFAST® FASTENER SELECTOR GUIDE

| Type | Primary Use | | | | |
|------|--|--|---|-----------------------------------|---|
| | Joining two panels of similar or dissimilar metals | Joining two panels when one is stainless steel | Joining a metal panel to a PCB or plastic panel | Single point hinging applications | Offers highest corrosion resistance in product family |
| SF | • | | | • (1) | |
| SFP | | • | | • (1) | • |
| SFW | | | | • | |
| SFK | | | • | • (1) | |

(1) Not primary use. Can be used as hinge point if required.

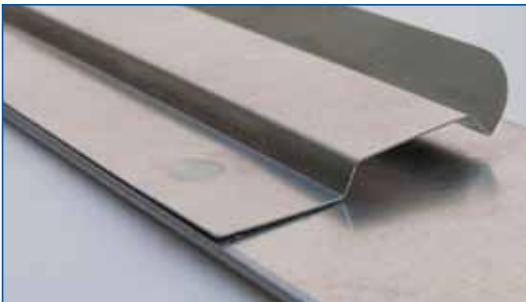
METAL TO METAL



Type SF fastener installed into unequal thickness sheets. Fastener is smooth with top of panel 1.



Type SF fastener installed sub-flush with panel 2. Fastener will be flush at minimum sheet thickness.



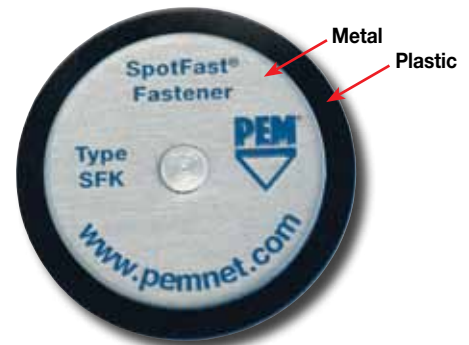
Sheets as thin as .005"/0.13mm may be attached to thicker sheets using a PEM® SpotFast® fastener. The thin sheet must be panel 1 and the "L" dimension must be equal to or less than the combined panel thicknesses.

HINGING APPLICATIONS



Type SFW fastener offers flush-mounted, smooth pivot point.

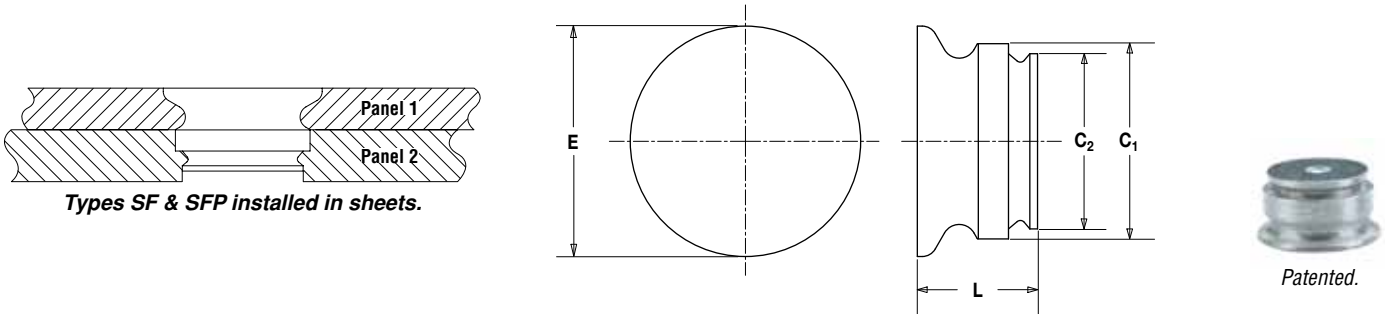
METAL TO PCB/PLASTIC



Type SFK fastener joining metal to plastic.

SPOTFAST® FASTENERS

TYPE SF FOR PERMANENT JOINING OF TWO METAL SHEETS



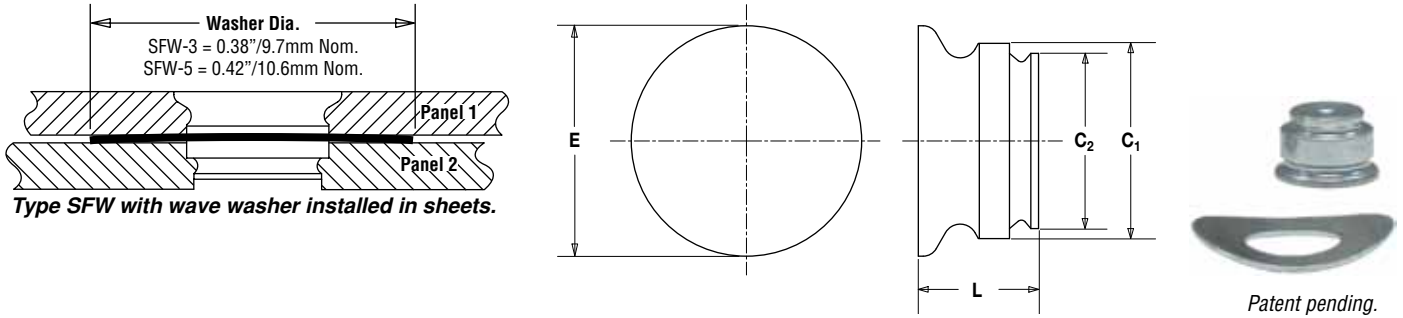
| Type and Size | Thickness Code | Panel 1 | | | | Panel 2 | | | | C ₁ Max. | | C ₂ Max. | | E Max. | | L Max. | | Min. Dist Hole \varnothing To Edge | |
|---------------|----------------|--|------|---|------|--------------------|------|---|------|---------------------|------|---------------------|------|--------|------|--------|------|--------------------------------------|-----|
| | | Thickness $\pm 0.08\text{mm} / \pm .003''$ | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | Thickness Min. (1) | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | | | | | | | | | | |
| | | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. |
| SF-3 | 0.8 | 0.8 | .031 | 3 | .118 | 0.8 | .031 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.53 | .139 | 1.5 | .059 | 2.54 | .1 |
| SF-3 | 1.0 | 1 | .039 | 3 | .118 | 1 | .039 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 1.9 | .075 | 2.54 | .1 |
| SF-3 | 1.2 | 1.2 | .047 | 3 | .118 | 1.2 | .047 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 2.31 | .091 | 2.54 | .1 |
| SF-3 | 1.6 | 1.6 | .063 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 3.12 | .123 | 2.54 | .1 |
| SF-5 | 0.8 | 0.8 | .031 | 5 | .197 | 0.8 | .031 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 1.5 | .059 | 3.56 | .14 |
| SF-5 | 1.0 | 1 | .039 | 5 | .197 | 1 | .039 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 1.9 | .075 | 3.6 | .14 |
| SF-5 | 1.2 | 1.2 | .047 | 5 | .197 | 1.2 | .047 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 2.31 | .091 | 3.6 | .14 |
| SF-5 | 1.6 | 1.6 | .063 | 5 | .197 | 1.6 | .063 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 3.12 | .123 | 3.6 | .14 |

TYPE SFP FOR INSTALLATION INTO STAINLESS STEEL SHEETS

| Type and Size | Thickness Code | Panel 1 | | | | Panel 2 | | | | C ₁ Max. | | C ₂ Max. | | E Max. | | L Max. | | Min. Dist Hole \varnothing To Edge | |
|---------------|----------------|--|------|---|------|--------------------|------|---|------|---------------------|------|---------------------|------|--------|------|--------|------|--------------------------------------|-----|
| | | Thickness $\pm 0.08\text{mm} / \pm .003''$ | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | Thickness Min. (1) | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | | | | | | | | | | |
| | | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. |
| SFP-3 | 1.0 | 1 | .039 | 3 | .118 | 1 | .039 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 1.9 | .075 | 2.54 | .1 |
| SFP-3 | 1.2 | 1.2 | .047 | 3 | .118 | 1.2 | .047 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 2.31 | .091 | 2.54 | .1 |
| SFP-3 | 1.6 | 1.6 | .063 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 3.12 | .123 | 2.54 | .1 |
| SFP-5 | 1.0 | 1 | .039 | 5 | .197 | 1 | .039 | 4.5 | .177 | 4.98 | .196 | 4.47 | .176 | 5.56 | .219 | 1.9 | .075 | 3.6 | .14 |
| SFP-5 | 1.2 | 1.2 | .047 | 5 | .197 | 1.2 | .047 | 4.5 | .177 | 4.98 | .196 | 4.47 | .176 | 5.56 | .219 | 2.31 | .091 | 3.6 | .14 |
| SFP-5 | 1.6 | 1.6 | .063 | 5 | .197 | 1.6 | .063 | 4.5 | .177 | 4.98 | .196 | 4.47 | .176 | 5.56 | .219 | 3.12 | .123 | 3.6 | .14 |

SPOTFAST® FASTENERS

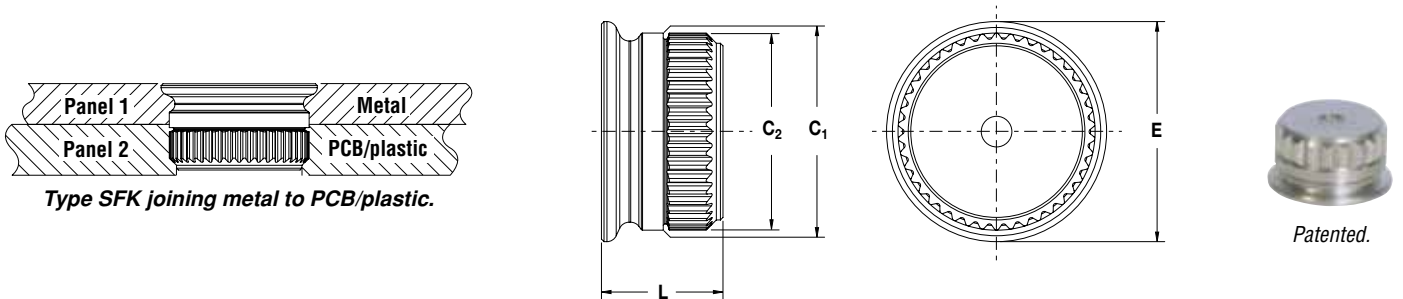
TYPE SFW WITH WAVE WASHER FOR SINGLE POINT HINGING APPLICATIONS



| Type and Size (2) | Thickness Code | Panel 1 | | | | Panel 2 | | | | C ₁ Max. | | C ₂ Max. | | E Max. | | L Max. | | Min. Dist Hole \varnothing To Edge | |
|-------------------|----------------|--|------|---|------|--------------------|------|---|------|---------------------|------|---------------------|------|--------|------|--------|------|--------------------------------------|-----|
| | | Thickness $\pm 0.08\text{mm} / \pm .003''$ | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | Thickness Min. (1) | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | | | | | | | | | | |
| | | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. |
| SFW-3 | 0.8 | 0.8 | .031 | 3 | .118 | 0.8 | .031 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.53 | .139 | 2.09 | .082 | 2.54 | .1 |
| SFW-3 | 1.0 | 1 | .039 | 3 | .118 | 1 | .039 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 2.49 | .098 | 2.54 | .1 |
| SFW-3 | 1.2 | 1.2 | .047 | 3 | .118 | 1.2 | .047 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 2.90 | .114 | 2.54 | .1 |
| SFW-3 | 1.6 | 1.6 | .063 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.48 | .097 | 3.76 | .148 | 3.71 | .146 | 2.54 | .1 |
| SFW-5 | 0.8 | 0.8 | .031 | 5 | .197 | 0.8 | .031 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 1.98 | .078 | 3.6 | .14 |
| SFW-5 | 1.0 | 1 | .039 | 5 | .197 | 1 | .039 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 2.39 | .094 | 3.6 | .14 |
| SFW-5 | 1.2 | 1.2 | .047 | 5 | .197 | 1.2 | .047 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 2.79 | .110 | 3.6 | .14 |
| SFW-5 | 1.6 | 1.6 | .063 | 5 | .197 | 1.6 | .063 | 4 | .157 | 4.98 | .196 | 3.97 | .156 | 5.56 | .219 | 3.61 | .142 | 3.6 | .14 |

(1) Fastener will provide flush application at minimum sheet thickness. (2) Type SFW fasteners are shipped with mating washers.

TYPE SFK FOR JOINING METAL TO PCB/PLASTIC PANELS



| Type and Size | Thickness Code | Panel 1 | | | | Panel 2 | | | | C ₁ Max. | | C ₂ $\pm 0.08\text{mm} / \pm .003''$ | | E Max. | | L Max. | | Min. Dist Hole \varnothing To Edge | |
|---------------|----------------|--|------|---|------|--------------------|------|---|------|---------------------|------|---|------|--------|------|--------|------|--------------------------------------|------|
| | | Thickness $\pm 0.08\text{mm} / \pm .003''$ | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | Thickness Min. (1) | | Mounting Hole $+0.08\text{mm} / +.003'' - .000''$ | | | | | | | | | | | |
| | | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. |
| SFK-3 | 0.8 | 0.8 | .031 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.9 | .114 | 3.53 | .139 | 2.31 | .091 | 3 | 0.12 |
| SFK-3 | 1.0 | 1 | .039 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.9 | .114 | 3.76 | .148 | 2.51 | .099 | 3 | 0.12 |
| SFK-3 | 1.2 | 1.2 | .047 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.9 | .114 | 3.76 | .148 | 2.72 | .107 | 3 | 0.12 |
| SFK-3 | 1.6 | 1.6 | .063 | 3 | .118 | 1.6 | .063 | 2.5 | .098 | 2.98 | .117 | 2.9 | .114 | 3.76 | .148 | 3.12 | .123 | 3 | 0.12 |
| SFK-5 | 0.8 | 0.8 | .031 | 5 | .197 | 1.6 | .063 | 4.5 | .177 | 4.98 | .196 | 4.9 | .193 | 5.56 | .219 | 2.31 | .091 | 5.1 | 0.20 |
| SFK-5 | 1.0 | 1 | .039 | 5 | .197 | 1.6 | .063 | 4.5 | .177 | 4.98 | .196 | 4.9 | .193 | 5.56 | .219 | 2.51 | .099 | 5.1 | 0.20 |
| SFK-5 | 1.2 | 1.2 | .047 | 5 | .197 | 1.6 | .063 | 4.5 | .177 | 4.98 | .196 | 4.9 | .193 | 5.56 | .219 | 2.72 | .107 | 5.1 | 0.20 |
| SFK-5 | 1.6 | 1.6 | .063 | 5 | .197 | 1.6 | .063 | 4.5 | .177 | 4.98 | .196 | 4.9 | .193 | 5.56 | .219 | 3.12 | .123 | 5.1 | 0.20 |

(1) Fastener will provide flush application at minimum sheet thickness.

MATERIAL AND FINISH SPECIFICATIONS

| Type | Fastener Materials | | Standard Finishes | | | For Use in Sheet Hardness: (2) | |
|-------------------------------|---------------------------|---|--|---------------------------------|--|--------------------------------|-------------------------|
| | Heat-treated Carbon Steel | Precipitation Hardening Grade Stainless Steel | Passivated and/or Tested Per ASTM A380 | Zinc Plated, 5µm, Colorless (1) | Zinc Plated, 5µm, Colorless with Lubricant (1) | HRB 80 / HB 150 or Less | HRB 88 / HB 183 or Less |
| SF | • | | | • | | • | |
| SFP | | • | • | | | | • |
| SFW | • | | | | • | • | |
| Wave washer | • | | | • | | | |
| SFK | • | | | • | | • | |
| Part Number Code For Finishes | | | None | ZI | LZ | | |

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

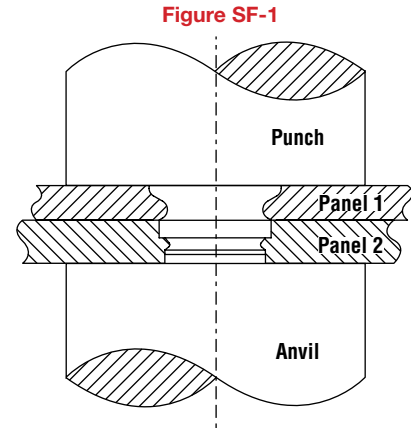
(2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

INSTALLATION

TYPE SF AND SFP

- Step 1.** Prepare properly sized mounting hole in both panels. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install fastener into punched side of hole.
- Step 2.** Place Panel 2 with smaller mounting hole on anvil and align Panel 1 mounting hole with the mounting hole of Panel 2. Place the smaller diameter end of the fastener through the mounting holes as shown in the drawing to the right. (See figure SF-1).
- Step 3.** With the punch and anvil surfaces parallel, apply squeezing force until the fastener is flush with the top of Panel 1. (See figure SF-1).

NOTE: To use Type SF or SFP as a flush-mounted pivot point, for best results, install SpotFast fastener into Panel 1 first, then place Panel 2 over fastener and squeeze again.



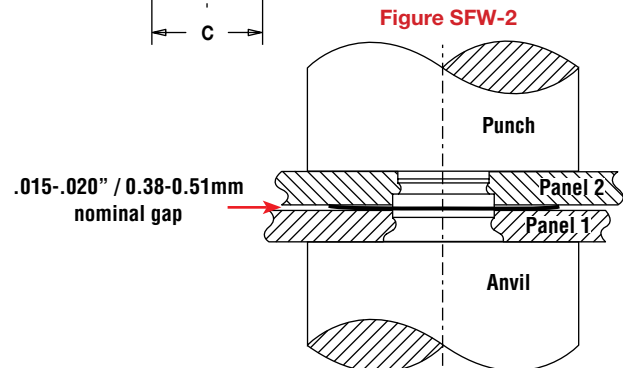
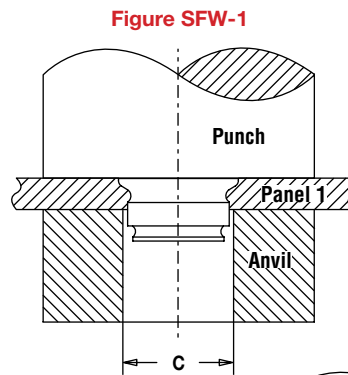
TYPE SFW

- Step 1.** Prepare properly sized mounting hole in both panels. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install fastener into punched side of hole.
- Step 2.** Using only Panel 1, with the punch and anvil surfaces parallel, apply squeezing force until the fastener is flush with the top of Panel 1. (See figure SFW-1).
- Step 3.** Place washer over installed fastener (concave side facing up), then place Panel 2 over fastener. Apply squeezing force. Keep .015-.020" / 0.38-0.51mm nominal gap between two sheets after installation. (See figure SFW-2).

ANVIL DIMENSIONS

| Size | C ±0.13/±.005 (mm) / (.in.) | Punch Part No. | Anvil Part No.* |
|-------|-----------------------------------|-------------------|--------------------|
| SFW-3 | 3.05 / .120 | 975200048 | 970200229300 |
| SFW-5 | 5.05 / .199 | 975200048 | 970200020300 |

* Part number for anvil used in Step 2



INSTALLATION (Continued)

TYPE SFK

- Step 1.** Prepare properly sized mounting hole in both panels. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install fastener into punched side of hole.
- Step 2.** Using only Panel 1, with the punch and anvil surfaces parallel, apply squeezing force until the fastener is flush with the top of Panel 1. (See figure SFK-1).
- Step 3.** Place Panel 2 over fastener and apply squeezing force. (See figure SFK-2).

Figure SFK-1

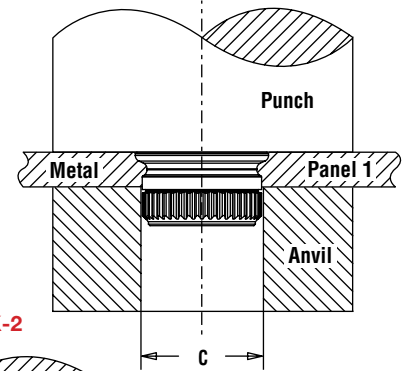
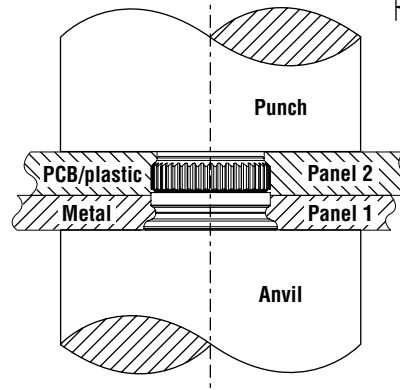


Figure SFK-2



ANVIL DIMENSIONS

| Size | C ±0.13/±.003 (mm) / (in.) | Punch Part No. | Anvil Part No.* |
|-------|----------------------------------|-------------------|--------------------|
| SFK-3 | 3.05 / .120 | 975200048 | 970200229300 |
| SFK-5 | 5.05 / .199 | 975200048 | 970200020300 |

* Part number for anvil used in Step 2

PERFORMANCE DATA⁽¹⁾

TYPE SF

| Type and Size | Thickness Code | Installation | | | | Pushout | | | |
|---------------|----------------|-------------------|------|----------|------|-------------------|------|----------|------|
| | | Cold-rolled Steel | | Aluminum | | Cold-rolled Steel | | Aluminum | |
| | | kN | lbs. | kN | lbs. | N | lbs. | N | lbs. |
| SF-3 | 0.8 | 8 | 1800 | 6 | 1350 | 360 | 80 | 200 | 45 |
| SF-3 | 1.0 | 9 | 2025 | 6.5 | 1475 | 525 | 115 | 250 | 55 |
| SF-3 | 1.2 | 11 | 2475 | 7 | 1575 | 555 | 125 | 310 | 70 |
| SF-3 | 1.6 | 13 | 2925 | 7.5 | 1700 | 920 | 205 | 550 | 125 |
| SF-5 | 0.8 | 11 | 2475 | 8 | 1800 | 625 | 140 | 310 | 70 |
| SF-5 | 1.0 | 12 | 2700 | 9.5 | 2150 | 800 | 180 | 515 | 115 |
| SF-5 | 1.2 | 18 | 4050 | 10 | 2250 | 1200 | 270 | 770 | 170 |
| SF-5 | 1.6 | 20 | 4500 | 12.5 | 2825 | 1500 | 335 | 1145 | 255 |

TYPE SFP

| Type and Size | Thickness Code | Stainless Steel | | | |
|---------------|----------------|-----------------|------|---------|------|
| | | Installation | | Pushout | |
| | | kN | lbs. | N | lbs. |
| SFP-3 | 1.0 | 13.5 | 3000 | 620 | 140 |
| SFP-3 | 1.2 | 20 | 4500 | 830 | 186 |
| SFP-3 | 1.6 | 22 | 5000 | 1500 | 340 |
| SFP-5 | 1.0 | 18 | 4000 | 990 | 222 |
| SFP-5 | 1.2 | 27 | 6000 | 1158 | 260 |
| SFP-5 | 1.6 | 33 | 7500 | 3117 | 701 |

(1) The values reported are averages when all installation specifications and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure will affect this data. Performance testing of this product in your application is recommended. We will be happy to provide samples for this purpose or perform the installation for you.

SPOTFAST® FASTENERS

PERFORMANCE DATA⁽¹⁾

TYPE SFW

| Type and Size | Thickness Code | Installation into Panel 1 | | | | Installation into Panel 2 | | | | Pushout of Panel 2 | | | |
|---------------|----------------|---------------------------|------|----------|------|---------------------------|------|----------|------|--------------------|------|----------|------|
| | | Cold-rolled Steel | | Aluminum | | Cold-rolled Steel | | Aluminum | | Cold-rolled Steel | | Aluminum | |
| | | kN | lbs. | kN | lbs. | kN | lbs. | kN | lbs. | N | lbs. | N | lbs. |
| SFW-3 | 0.8 | 4.5 | 1010 | 2.5 | 560 | 3 | 675 | 2 | 450 | 350 | 78 | 85 | 19 |
| SFW-3 | 1.0 | 5.5 | 1240 | 3.5 | 780 | 4.5 | 1010 | 2 | 450 | 375 | 84 | 140 | 31 |
| SFW-3 | 1.2 | 6 | 1350 | 3.5 | 780 | 5 | 1125 | 2 | 450 | 500 | 112 | 250 | 56 |
| SFW-3 | 1.6 | 7 | 1575 | 4 | 900 | 6 | 1350 | 2.5 | 560 | 780 | 175 | 340 | 76 |
| SFW-5 | 0.8 | 7 | 1575 | 3.5 | 780 | 8 | 1800 | 4 | 900 | 350 | 78 | 270 | 61 |
| SFW-5 | 1.0 | 7 | 1575 | 3.5 | 780 | 8.5 | 1910 | 5 | 1125 | 380 | 153 | 425 | 96 |
| SFW-5 | 1.2 | 7 | 1575 | 4 | 900 | 8.5 | 1910 | 5 | 1125 | 925 | 208 | 510 | 115 |
| SFW-5 | 1.6 | 9 | 2025 | 5 | 1125 | 10 | 2250 | 5 | 1125 | 1450 | 326 | 600 | 135 |

TYPE SFK

| Type and Size | Thickness Code | Installation into Panel 1 | | Installation into Panel 2 | | Pushout of Panel 2 ⁽²⁾ | |
|---------------|----------------|---------------------------|------|---------------------------|------|-----------------------------------|------|
| | | Cold-rolled Steel | | FR-4 Fiberglass | | FR-4 Fiberglass | |
| | | kN | lbs. | kN | lbs. | N | lbs. |
| SFK-3 | 0.8 | 6.2 | 1400 | 1.8 | 400 | 200 | 45 |
| SFK-3 | 1.0 | 8 | 1800 | 1.8 | 400 | 200 | 45 |
| SFK-3 | 1.2 | 8.9 | 2000 | 1.8 | 400 | 200 | 45 |
| SFK-3 | 1.6 | 10.2 | 2300 | 1.8 | 400 | 200 | 45 |
| SFK-5 | 0.8 | 11.1 | 2500 | 1.8 | 400 | 400 | 90 |
| SFK-5 | 1.0 | 13.5 | 3000 | 1.8 | 400 | 400 | 90 |
| SFK-5 | 1.2 | 15.6 | 3500 | 1.8 | 400 | 400 | 90 |
| SFK-5 | 1.6 | 17.8 | 4000 | 1.8 | 400 | 400 | 90 |

(1) The values reported are averages when all installation specifications and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure will affect this data. Performance testing of this product in your application is recommended. We will be happy to provide samples for this purpose or perform the installation for you.

(2) In most applications, pullout strength of the SFK fastener in Panel 1 exceeds pushout strength of Panel 2.



RoHS compliance information can be found on our website.
© 2010 PennEngineering.

Specifications subject to change without notice.
Check our website for the most current version of this bulletin.
Technical support e-mail: techsupport@pemnet.com

PennEngineering®



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

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