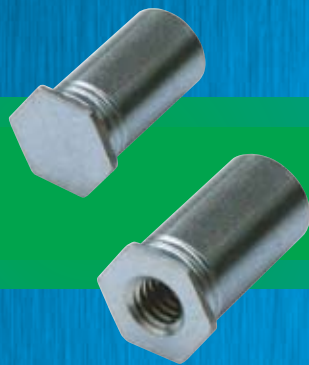


PennEngineering®

SELF-CLINCHING STANDOFFS



BULLETIN **SO**



1009  
REV. 610

# SELF-CLINCHING STANDOFFS

These standoffs, which use the proven self-clinching design, install with a squeeze in properly sized round holes – and become permanently mounted in the thin sheet.

PEM® brand thru-hole threaded standoffs (**Page 3**) are installed with their heads flush with one surface of the mounting sheet. When blind-threaded types (**Page 4**) are used, outer sheet surfaces are not only flush, but closed as well. Unthreaded standoffs (**Page 5**) are also available for spacing multi-panel assemblies.

Types SO4 and BSO4 standoffs (**Pages 6 and 7**) are for installation into stainless steel sheets as thin as 1.02 mm.

Types TSO, TSOS, and TSOA self-clinching threaded standoffs (**Page 8**) provide permanent threads in sheets as thin as 0.63 mm.

PEM® self-clinching standoffs are also available on special order in non-heat treated carbon steel as type SON (thru-hole threaded) or BSON (blind threaded).

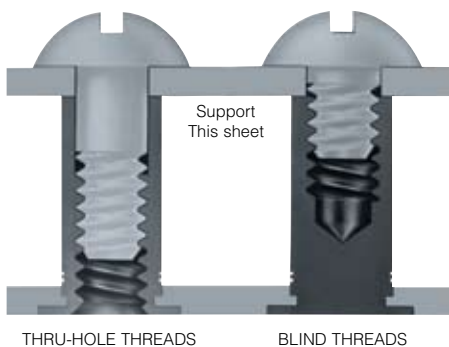
Types DSO and DSOS standoffs (**Page 9**) are available for close-to-edge applications.

Types SOAG and SOSG grounding standoffs (**Page 9**) are designed for clinching into steel or aluminum chassis while the “gripping teeth” on the opposite end of the standoff firmly contact mating PC board.

If you require a standoff which we do not offer in this bulletin, please contact us. We will be happy to work with you to satisfy your special need. For other types of PEM® brand standoffs and spacers see:

**Bulletin CH**  
**Bulletin K**  
**Bulletin SK**  
**Bulletin SSA**

PEM® Concealed-head Standoffs.  
PEM® Broaching and Surface Mount Standoffs for printed circuit boards.  
PEM® KEYHOLE® Standoffs.  
PEM® brand SNAP-TOP® Standoffs.



THRU-HOLE THREADS

BLIND THREADS

Always look for the “One or Two Groove” trademarks to be sure you are getting genuine PEM® brand standoffs. On actual parts, location of grooves on barrel may be different than shown in photo.

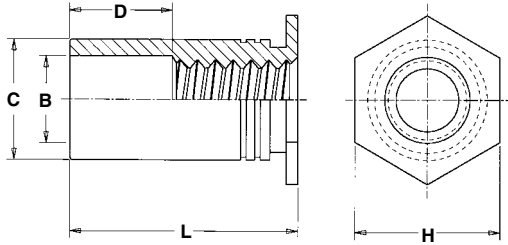


# SELF-CLINCHING STANDOFFS

## TYPES SO, SOA, AND SOS THRU-HOLE THREADED STANDOFFS

## GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.



METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	B Counter-Bore Dia. ±0.13	C -0.13	H Nom.	Min. Dist. Hole $\phi$ To Edge
	M3	1.02	4.22	3.2	4.2	4.8	6
	3.5M3	1.02	5.41	3.2	5.39	6.4	6.8
	M3.5	1.02	5.41	3.9	5.39	6.4	6.8
	M4	1.27	7.14	4.8	7.12	7.9	8
	M5	1.27	7.14	5.35	7.12	7.9	8

### PART NUMBER DESIGNATION



**SO**   **S**   -   **M3**   -   **8**   **ZI**

↓   ↓   ↓   ↓   ↓

Type   Material Code   Thread Size Code   Length Code   Finish

### THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

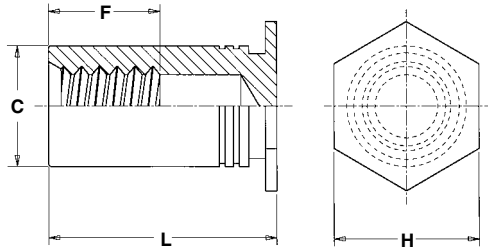
METRIC	Thread Size x Pitch	Type			Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)											
		Steel	Stainless Steel	Aluminum													
M3 x 0.5	SO	SOS	SOA	M3	3	4	6	8	10	12	14	16	18	N/A	N/A	N/A	
				3.5M3 <sup>(1)</sup>													
M3.5 x 0.6	SO	SOS	SOA	M3.5	3	4	6	8	10	12	14	16	18	20	22	25	
M4 x 0.7	SO	SOS	SOA	M4	3	4	6	8	10	12	14	16	18	20	22	25	
M5 x 0.8	SO	SOS	SOA	M5	3	4	6	8	10	12	14	16	18	20	22	25	
<b>D Dimension ±0.25</b>					<b>None</b>				<b>4</b>			<b>8</b>			<b>11</b>		

(1) Standoffs with thread code 3.5M3 offer greater wall thickness for thread size M3.  
N/A - Not Available.

Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

# SELF-CLINCHING STANDOFFS

## TYPES BSO, BSOA, AND BSOS BLIND THREADED STANDOFFS



## GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.

	Thread Code	Min. Sheet Thickness	Hole Size in Sheet +0.08	C -0.13	H Nom.	Min. Dist. Hole $\varnothing$ To Edge
METRIC	M3	1.02	4.22	4.2	4.8	6
	3.5M3	1.02	5.41	5.39	6.4	6.8
	M3.5	1.02	5.41	5.39	6.4	6.8
	M4	1.27	7.14	7.12	7.9	8
	M5	1.27	7.14	7.12	7.9	8

## PART NUMBER DESIGNATION



**BSO S - M3 - 8 ZI**

↓   ↓   ↓   ↓   ↓

Type   Material Code   Thread Size Code   Length Code   Finish

## THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

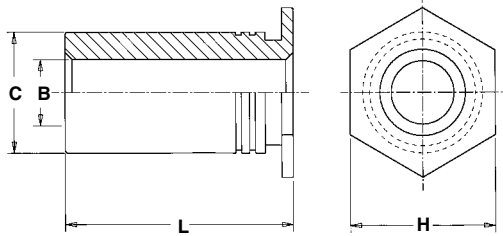
METRIC	Thread Size x Pitch	Type			Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)									
		Steel	Stainless Steel	Aluminum											
M3 x 0.5	BSO	BSOS	BSOA	M3	6	8	10	12	14	16	18	20	22	25	
				3.5M3 <sup>(1)</sup>											
M3.5 x 0.6	BSO	BSOS	BSOA	M3.5	6	8	10	12	14	16	18	20	22	25	
M4 x 0.7	BSO	BSOS	BSOA	M4	6	8	10	12	14	16	18	20	22	25	
M5 x 0.8	BSO	BSOS	BSOA	M5	6	8	10	12	14	16	18	20	22	25	
<b>F Dimension Min.</b>					<b>3.2</b>	<b>4</b>	<b>5</b>	<b>6.5</b>	<b>9.5</b>						

(1) Standoffs with thread code 3.5M3 offer greater wall thickness for thread size M3.

Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

# SELF-CLINCHING STANDOFFS

## TYPES SO, SOA, AND SOS THRU-HOLE UNTHREADED STANDOFFS



## GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.

METRIC	Thru-hole Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	H Nom.	Min. Dist. Hole $\varnothing$ To Edge
	43.1	1.02	4.22	4.2	4.8	6
	63.1	1.02	5.41	5.39	6.4	6.8
	63.6	1.02	5.41	5.39	6.4	6.8
	83.6	1.27	7.14	7.12	7.9	8
	84.1	1.27	7.14	7.12	7.9	8
85.1	1.27	7.14	7.12	7.9	8	

**PEM® thru-hole, unthreaded standoffs are available on special order only.**

## PART NUMBER DESIGNATION



**SO S - 43.1 - 8 ZI**

↓   ↓   ↓   ↓   ↓

Type   Material Code   Thru-hole Code   Length Code   Finish Code

## THRU-HOLE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

METRIC	B Thru-hole Diameter +0.1 -0.08	Type			Thru-hole Code	Length "L" +0.05 -0.13 (Length Code in millimeters)									
		Steel	Stainless Steel	Aluminum		3	4	6	8	10	12	14	16	18	20
	3.1	SO	SOS	SOA	43.1	3	4	6	8	10	12	14	16	18	20
					63.1 <sup>(1)</sup>										
	3.6	SO	SOS	SOA	63.6	3	4	6	8	10	12	14	16	18	20
					83.6 <sup>(1)</sup>										
	4.1	SO	SOS	SOA	84.1	3	4	6	8	10	12	14	16	18	20
	5.1	SO	SOS	SOA	85.1	3	4	6	8	10	12	14	16	18	20

(1) Standoffs with thread code 3.5M3 offer greater wall thickness for thread size M3.

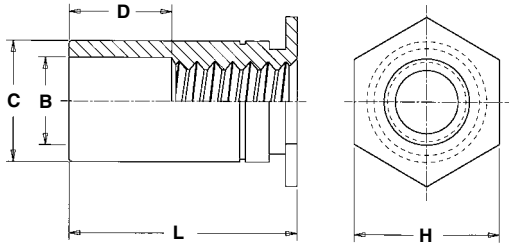
Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

# SELF-CLINCHING STANDOFFS

## TYPE SO4 THRU-HOLE THREADED STANDOFFS FOR INSTALLATION INTO STAINLESS STEEL SHEETS

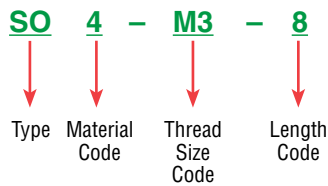
### GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.



METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	B Counter-Bore Dia. ±0.13	C -0.13	H Nom.	Min. Dist. Hole $\varnothing$ To Edge
	M3	1.02	4.22	3.25	4.2	4.8	6
	3.5M3	1.02	5.41	3.25	5.39	6.4	7.1
	M3.5	1.02	5.41	3.9	5.39	6.4	7.1
	M4	1.27	7.14	4.8	7.12	7.9	8.4
	M5	1.27	7.14	5.35	7.12	7.9	8.4

### PART NUMBER DESIGNATION



### THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)											
				3	4	6	8	10	12	14	16	18	N/A	N/A	N/A
	M3 x 0.5	SO4	M3	3	4	6	8	10	12	14	16	18	N/A	N/A	N/A
			3.5M3 <sup>(1)</sup>												
	M3.5 x 0.6	SO4	M3.5	3	4	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7	SO4	M4	3	4	6	8	10	12	14	16	18	20	22	25
	M5 x 0.8	SO4	M5	3	4	6	8	10	12	14	16	18	20	22	25
<b>D Dimension ±0.25</b>				<b>None</b>				<b>4</b>			<b>8</b>			<b>11</b>	

(1) Standoffs with thread code 3.5M3 offer greater wall thickness for thread size M3.

N/A Not Available.

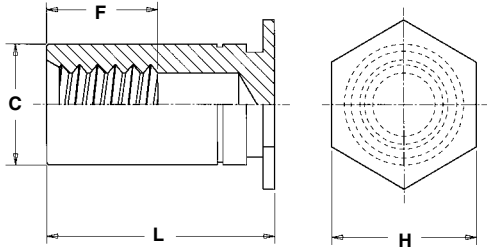
Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

# SELF-CLINCHING STANDOFFS

## TYPE BSO4 BLIND THREADED STANDOFFS FOR INSTALLATION INTO STAINLESS STEEL SHEETS

### GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.



METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	H Nom.	Min. Dist. Hole $\varnothing$ To Edge
	M3	1.02	4.22	4.2	4.8	6
	3.5M3	1.02	5.41	5.39	6.4	7.1
	M3.5	1.02	5.41	5.39	6.4	7.1
	M4	1.27	7.14	7.12	7.9	8.4
	M5	1.27	7.14	7.12	7.9	8.4

### PART NUMBER DESIGNATION



**BSO 4 - M3 - 8**

↓      ↓      ↓      ↓

Type    Material Code    Thread Size Code    Length Code

### THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)									
	M3 x 0.5	BS04	M3	6	8	10	12	14	16	18	20	22	25
			3.5M3 <sup>(1)</sup>										
	M3.5 x 0.6	BS04	M3.5	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7	BS04	M4	6	8	10	12	14	16	18	20	22	25
	M5 x 0.8	BS04	M5	6	8	10	12	14	16	18	20	22	25
<b>F Dimension Min.</b>			<b>3.2</b>	<b>4</b>		<b>5</b>	<b>6.5</b>			<b>9.5</b>			

(1) Standoffs with thread code 3.5M3 offer greater wall thickness for thread size M3.

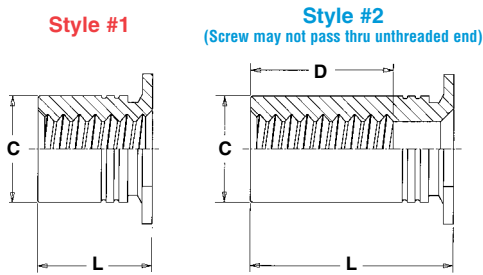
Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

# SELF-CLINCHING STANDOFFS

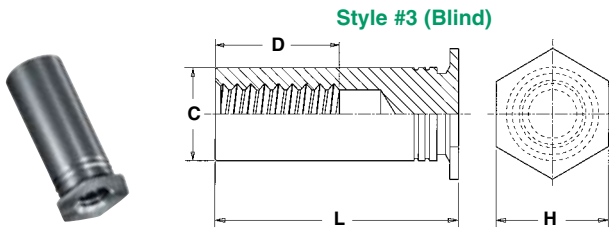
## TYPES TSO, TSOA AND TSOS THREADED STANDOFFS FOR SHEETS AS THIN AS .025"/0.63mm

### GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.



METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	D Min. Thread Depth	H Nom.	Min. Dist. Hole $\varnothing$ To Edge
	M25	0.63	4.22	4.2	5.2	4.8	5.8
6M25	0.63	5.41	5.39	6.4		7.1	
M3	0.63	4.22	4.2	6.2	4.8	5.8	
6M3	0.63	5.41	5.39		6.4	7.1	
M35	0.63	5.41	5.39	7	6.4	7.1	



### THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type			Thread Code	Length "L" $\pm 0.08$									
		Steel	Stainless Steel	Aluminum		For other lengths / thread depth data see chart below.									
		2.00	3.00	4.00		6.00	8.00	10.00	12.00	14.00	16.00	18.00	19.00		
Length Code (Length "L" without decimal point)															
M2.5 x 0.45	TSO	TSOS	TSOA	M25	200(1)	300(1)	400(1)	600(1)	800(2)	1000(3)	1200(3)	1400(3)	1600(3)	1800(3)	1900(3)
				6M25(4)											
M3 x 0.5	TSO	TSOS	TSOA	M3	200(1)	300(1)	400(1)	600(1)	800(2)	1000(2)	1200(3)	1400(3)	1600(3)	1800(3)	1900(3)
				6M3(4)											
M3.5 x 0.6	TSO	TSOS	TSOA	M35	N/A	300(1)	400(1)	600(1)	800(1)	1000(2)	1200(2)	1400(3)	1600(3)	1800(3)	1900(3)

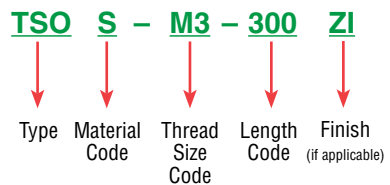
(1) **Style #1.** (2) **Style #2.** (3) **Style #3.** (N/A) Not Available  
 (4) Standoffs with thread code 6M3 offer greater wall thickness for thread size M3.  
 Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

### LENGTH/STYLE DATA

All dimensions are in millimeters.  
 (Length can be specified in .02mm increments.)

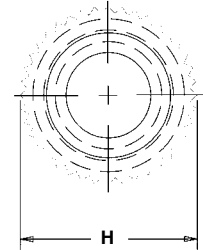
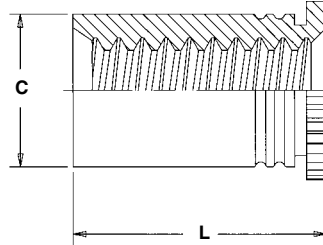
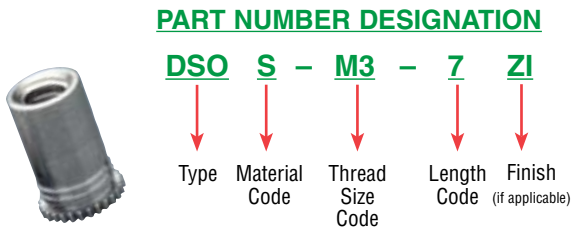
METRIC	Thread Code	Length "L" (Style #1)	Length "L" (Style #2)	Length "L" (Style #3)
	M25 6M25	2.00 - 6.30	6.32 - 9.50	9.52 - 19.00
M3 6M3	2.00 - 7.50	7.52 - 11.00	11.02 - 19.00	
M35	3.00 - 8.80	8.82 - 12.80	12.82 - 19.00	

### PART NUMBER DESIGNATION



# SELF-CLINCHING STANDOFFS

## TYPES DSO AND DSOS THREADED STANDOFFS FOR CLOSE-TO-EDGE APPLICATIONS



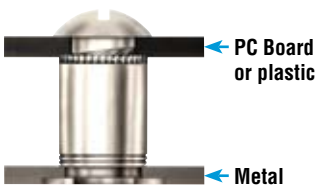
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type		Thread Code	Length Code	Sheet Thickness	Hole Size In Sheet +0.08	C Max.	H Nom.	L <sup>(1)</sup> +0.05 -0.13	Min. Dist. Hole $\phi$ To Edge
		Stainless Steel	Steel								
M3 x 0.5	DSOS	DSOS	DSO	M3	6.35	0.94 - 6.35	4.22	4.2	4.92	6.35	3.2
					7					7	

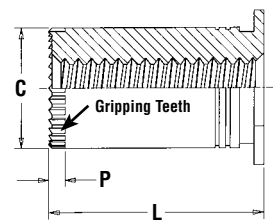
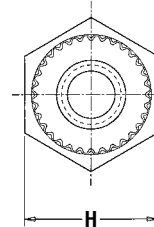
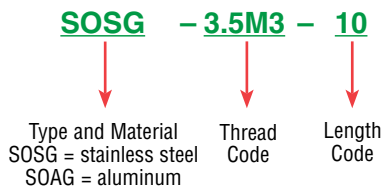
(1) Available in other lengths on special order.

Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

## TYPES SOSG AND SOAG GROUNDING STANDOFFS



**PART NUMBER DESIGNATION**



All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type		Thread Code	Length "L" +0.25 (Length Code is in millimeters) (2)					Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	H ±0.25	P Nom.	Min. Dist. Hole $\phi$ To Edge	D Anvil Hole +0.08
		Stainless Steel	Aluminum		3 <sup>NS</sup>	4 <sup>NS</sup>	6	8	10							
M3 x 0.5	SOSG	SOAG	3.5M3	3 <sup>NS</sup>	4 <sup>NS</sup>	6	8	10	12	1	5.4	5.39	6.4	0.76	6.8	5.5

(2) For special lengths greater than .500" / 12 mm, Types SOSG and SOAG are blind threaded.

# SELF-CLINCHING STANDOFFS

## MATERIAL AND FINISH SPECIFICATIONS

Type	Threads (1)	Fastener Materials					Standard Finishes			For Use In Sheet Hardness: (3)				
	Internal, ASME B1.1 2B ASME B1.13M, 6H	Heat-treated Carbon Steel	Non-heat Treated Carbon Steel	Aluminum	300 Series Stainless Steel	400 Series Stainless Steel	Zinc Plated 5µm, Colorless (2)	Passivated and/or Tested Per ASTM A380	No Finish	HRB 88 / HB 176 or Less	HRB 80 / HB 150 or Less	HRB 70 / HB 125 or Less	HRB 60 / HB 107 or Less	HRB 50 / HB 82 or Less
SO	•	•					•				•			
SOA	•			•					•					•
SOS	•				•				•		•			
SO4	•					•			•					
BSO	•	•					•			•				
BSOA	•			•					•					•
BSOS	•				•				•		•			
BSO4	•					•			•					
TSO	•		•				•					•		
TSOS	•				•				•		•			
TSOA	•			•					•					•
DSO	•	•					•			•				
DSOS	•				•				•		•			
SOAG	•			•					•					•
SOSG	•				•				•		•			
Part Number Codes For Finishes							ZI	None	None					

(1) Where applicable.

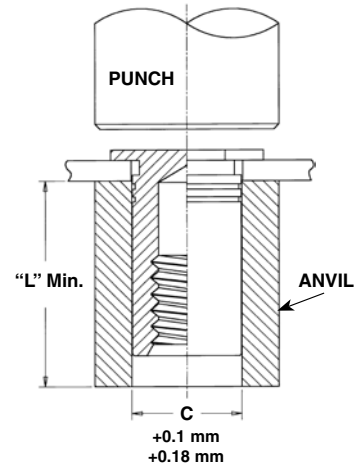
(2) See PEM Technical Support section of our web site for related plating standards and specifications.

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

## INSTALLATION

### TYPES SO, SOA, SOS, SO4, BSO, BSOA, BSOS AND BSO4

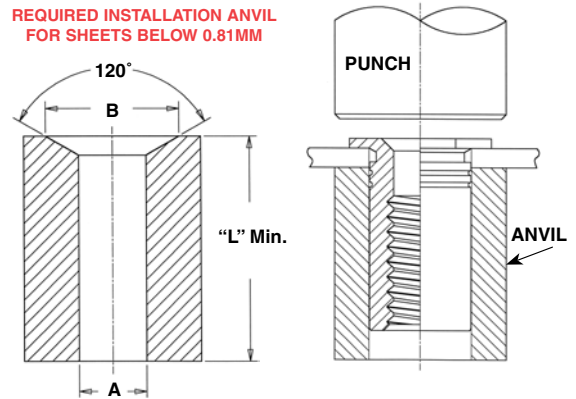
1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operation such as deburring.
2. Insert standoff through mounting hole of sheet and into anvil as shown in drawing.
3. With punch and anvil surfaces parallel, apply only enough squeezing force to embed the standoff's head flush in the sheet. Drawing at right shows suggested tooling for applying these forces.



### TYPES TSO, TSOA AND TSOS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operation such as deburring.
2. Insert standoff through mounting hole of sheet and into anvil as shown in drawing.
3. With punch and anvil surfaces parallel, apply only enough squeezing force to embed the standoff's head flush in the sheet. Drawing at right shows required installation anvil for sheet thickness of 0.63 to 0.81mm. A chamfered anvil is not required for sheets over 0.81mm.

REQUIRED INSTALLATION ANVIL FOR SHEETS BELOW 0.81MM



All dimensions are in millimeters.

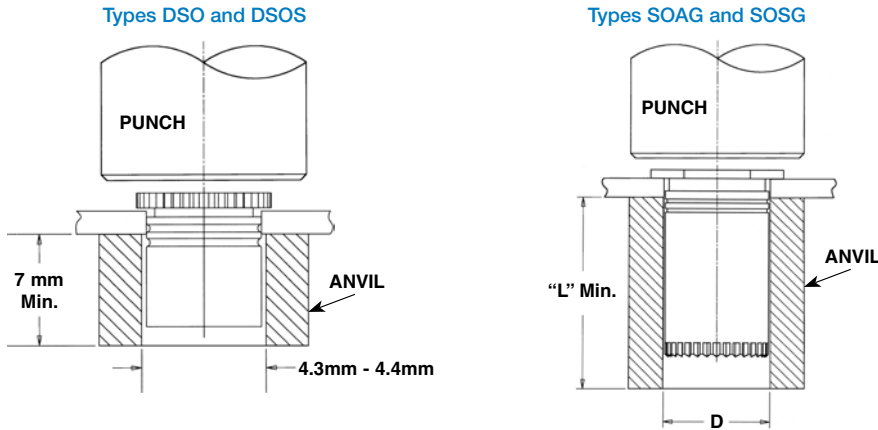
Standoff "C" Dimensions	Anvil Dimensions	
	A	B
4.19	4.24 - 4.32	4.75 - 4.93
5.39	5.41 - 5.49	6.35 - 6.53

# SELF-CLINCHING STANDOFFS

## INSTALLATION

### TYPES DSO, DSOS, SOAG AND SOSG

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



**PEMSERTER® PRESSES**

For best results we recommend using a PEMSERTER® press for either manual or automatic installation of PEM standoffs. For more information on our line of presses call 1-800-523-5321, or check our web site.

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

### TYPES SO, SOA, SOS, BSO, BSOA AND BSOS

METRIC	Thread Code	Standoff Material	Max. Rec. Tightening Torque For Mating Screw (N•m)	Test Sheet Material							
				1.5 mm 5052-H34 Aluminum <sup>(2)</sup>				1.5 mm Cold-rolled Steel <sup>(2)</sup>			
				Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull-thru (N)	Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull-thru (N)
M3	Steel	0.55	4.9	710	1.24	1245	9.8	1000	2.15	1465	
	Stainless Steel	0.44	4.9	710	1.24	996	9.8	1000	2.15	1172	
	Aluminum	0.33	4.9	710	1.24	747	(3)	(3)	(3)	(3)	
3.5M3	Steel	0.55	7.6	1330	1.24	1245	14.7	1860	2.15	1465	
	Stainless Steel	0.44	7.6	1330	1.24	996	14.7	1860	2.15	1172	
	Aluminum	0.33	7.6	1330	1.24	747	(3)	(3)	(3)	(3)	
M3.5	Steel	0.91	7.6	1330	2.82	1375	14.7	1860	3.95	1690	
	Stainless Steel	0.73	7.6	1330	2.82	1100	14.7	1860	3.95	1352	
	Aluminum	0.55	7.6	1330	2.82	825	(3)	(3)	(3)	(3)	
M4, M5	Steel	2, 3.6	10.7	1780	5.08	2575	17.8	2490	8.47	3110	
	Stainless Steel	1.6, 2.88	10.7	1780	5.08	2060	17.8	2490	8.47	2488	
	Aluminum	1.2, 2.16	10.7	1780	5.08	1545	(3)	(3)	(3)	(3)	

(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.

(2) Standoffs installed in sheets thinner than 1.5mm and greater than the specified minimum sheet thickness will have pull-thru, pushout, and torque-out values approximately 80% of tabulated values.

(3) Not recommended.

# SELF-CLINCHING STANDOFFS

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

### TYPES SO4 AND BSO4

METRIC	Thread Code	Max. Rec. Tightening Torque For Mating Screw (N•m)	Test Sheet Material			
			1.3 mm 300 Series Stainless Steel			
			Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull-thru (N)
	M3	0.55	24.5	1493	2.36	2650
	3.5M3	0.55	42.3	2877	2.36	3025
	M3.5	0.91	42.3	2877	3.06	3025
	M4	2	46.7	4003	6.34	6458
	M5	3.6	46.7	4003	8.89	6226

### TYPES TSO, TSOA AND TSOS

Standoff "C" Dimension	Standoff Material	Test Sheet Material					
		0.64 mm 5052-H34 Aluminum			0.64 mm Cold-rolled Steel		
		Installation (kN)	Pushout (N)	Torque-out (N•m)	Installation (kN)	Pushout (N)	Torque-out (N•m)
4.19 mm	Steel	6.7	311	0.68	8.9	445	1
	Stainless Steel	6.7	311	0.68	8.9	445	1
	Aluminum	6.7	311	0.68	—	—	—
5.38 mm	Steel	8	400	1.24	11.1	667	1.7
	Stainless Steel	8	400	1.24	11.1	667	1.7
	Aluminum	8	400	1.24	—	—	—

### TYPES DSO AND DSOS

METRIC	Thread Code	Max. Rec. Tightening Torque For Mating Screw (N•m)	Test Sheet Material					
			1 mm 5052-H34 Aluminum			1 mm Cold-rolled Steel		
			Installation (kN)	Pushout (N)	Torque-out (N•m)	Installation (kN)	Pushout (N)	Torque-out (N•m)
	M3	0.44	4.5	223	1.1	5.8	334	1.1

### TYPES SOAG AND SOSG

METRIC	Thread Code	Test Sheet Thickness and Test Sheet Material	Installation (kN)	Pushout (N) (2)	Torque-out (N•m)
	3.5M3	1.6MM 5052-H34 Aluminum	7.6	1330	2.82

(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.

(2) These are typical values for parts installed in drilled mounting holes. Punched mounting holes yield values approximately 15% less.

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.

**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](http://www.pemnet.com)