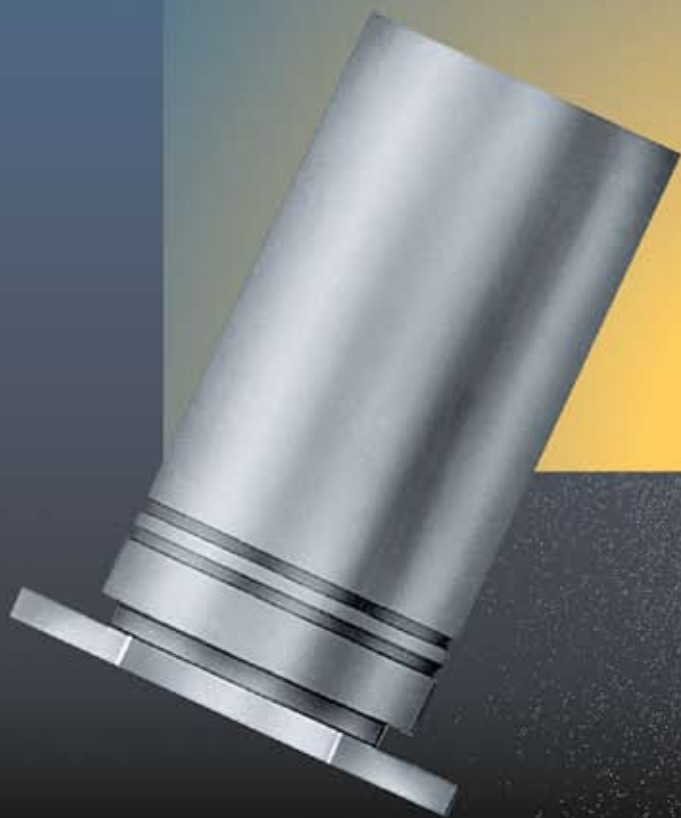




SELF-CLINCHING

STANDOFFS

BULLETIN



SO

1206

Revised 608

SELF-CLINCHING STANDOFFS

These standoffs, which use the proven self-clinching design, install with a squeeze in punched or drilled 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 3**) are used, outer sheet surfaces are not only flush, but closed as well. Unthreaded standoffs (**Page 4**) are also available for spacing multi-panel assemblies.

Types SO4 and BS04 standoffs (**Page 5**) are for installation into stainless steel sheets as thin as .040" / 1.02 mm.

Types TSO, TSOS, and TSOA self-clinching threaded standoffs (**Page 6**) provide permanent threads in sheets as thin as .025" / 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 4**) are available for close-to-edge applications.

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:

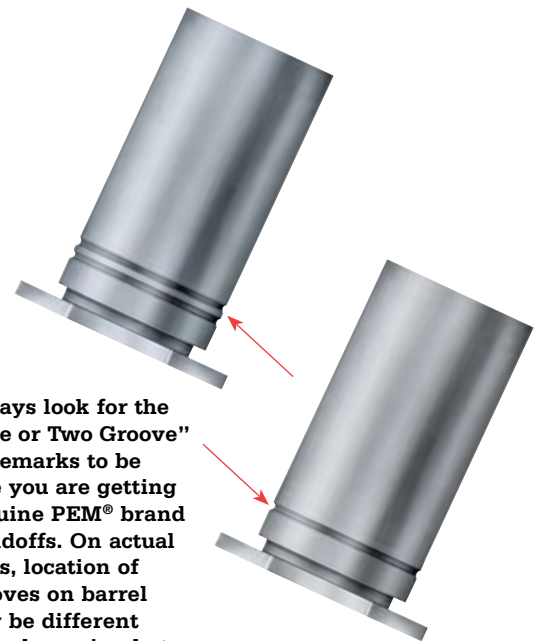
Bulletin CH PEM® Concealed-head Standoffs.

Bulletin K PEM® Standoffs for printed circuit boards.

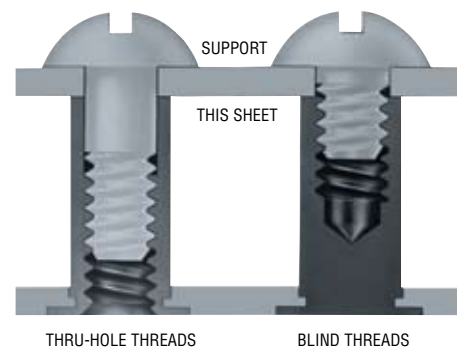
Bulletin SK PEM® KEYHOLE® Standoffs.

Bulletin SMT PEM® ReelFast™ SMT Spacers/Nuts.

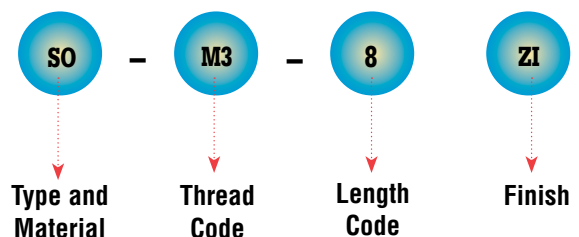
Bulletin SSA PEM® brand SNAP-TOP® Standoffs.



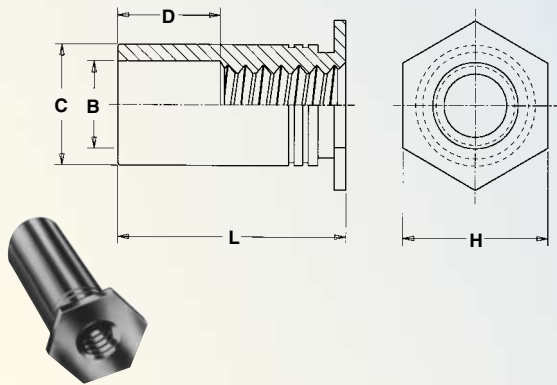
Always look for the "One or Two Groove" trademarks to be sure you are getting genuine PEM® brand standoffs. On actual parts, location of grooves on barrel may be different than shown in photo.



Part Number Designation



TYPES SO, SOA, SOS THRU-HOLE THREADED STANDOFFS



GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.

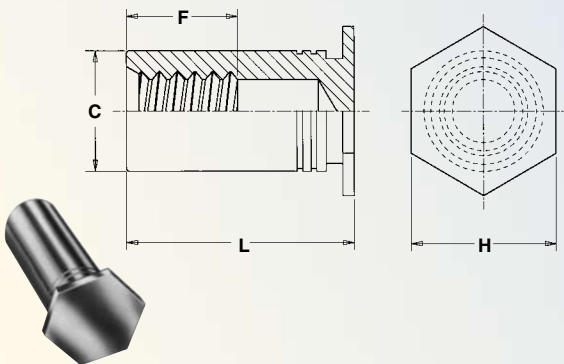
METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	B Counter-Bore Dia. ±0.13	C -0.13	H Nom.	Min. Dist. Hole C/L To Edge
	M3	1.02	4.22	3.2	4.2	4.8	6
	3.5M3	1.02	5.41	3.2	5.39	6.4	6.8
	M3.5	1.02	5.41	3.9	5.39	6.4	6.8
	M4	1.27	7.14	4.8	7.12	7.9	8
	M5	1.27	7.14	5.35	7.12	7.9	8

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 3.5M3 ⁽¹⁾	3	4	6	8	10	12	14	16	18	N/A	N/A	N/A
	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				M4												
	M5 x 0.8				M5												
	D Dimension ±0.25					None			4			8			11		

TYPES BSO, BSOA, BSOS BLIND THREADED STANDOFFS



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 C/L To Edge
	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

THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

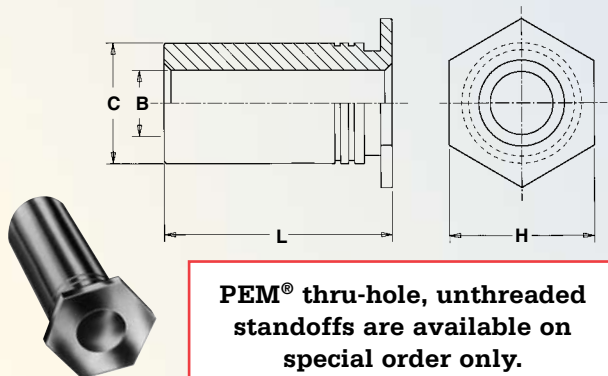
METRIC	Thread Size x Pitch	Type			Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)										
		Steel	Stainless Steel	Aluminum												
	M3 x 0.5	BSO	BSOS	BSOA	M3	6	8	10	12	14	16	18	20	22	25	
					3.5M3 ⁽¹⁾											
	M3.5 x 0.6	BSO	BSOS	BSOA	M3.5	6	8	10	12	14	16	18	20	22	25	
	M4 x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

(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.

TYPES SO, SOA, SOS THRU-HOLE UNTHREADED STANDOFFS



GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.

	Thru-hole Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	H Nom.	Min. Dist. Hole C/L To Edge
METRIC	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

THRU-HOLE DIAMETER AND LENGTH SELECTION DATA

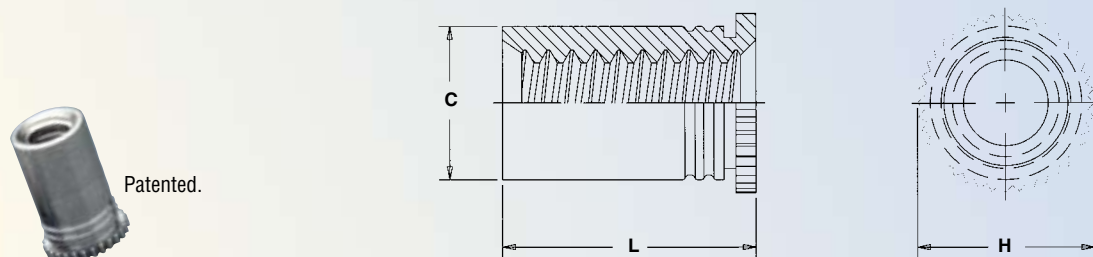
All dimensions are in millimeters.

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											
	3.1	SO	SOS	SOA	43.1	3	4	6	8	10	12	14	16	18	20
					63.1 ⁽¹⁾										
	3.6	SO	SOS	SOA	63.6	3	4	6	8	10	12	14	16	18	20
					83.6 ⁽¹⁾										
	4.1	SO	SOS	SOA	84.1	3	4	6	8	10	12	14	16	18	20
					85.1										

(1) Standoffs with thru-hole codes 63.1 and 83.6 offer greater wall thickness for that thru-hole diameter.

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

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 ⁽¹⁾ +0.05 -0.13	Min. Dist. Hole C/L To Edge
		Stainless Steel	Steel								
	M3 x 0.5	DSOS	DSO ^(NS)	M3	6.35 7	0.94 - 6.35	4.2	4.2	4.92	6.35 7	3.2

(1) Available in other lengths on special order.

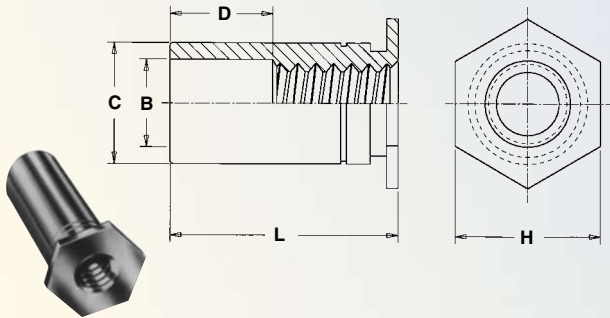
(NS) Not Stocked, available on special order.

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

TYPE S04 THRU-HOLE THREADED STANDOFFS FOR INSTALLATION INTO STAINLESS STEEL

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 C/L 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

THREAD SIZE AND LENGTH SELECTION DATA

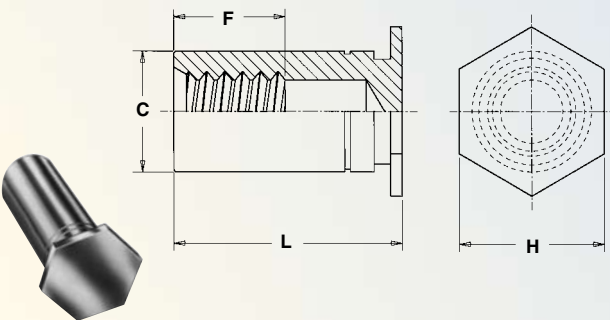
All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)											
	M3 x 0.5	S04	M3	3	4	6	8	10	12	14	16	18	N/A	N/A	N/A
			3.5M3 ⁽¹⁾												
	M3.5 x 0.6	S04	M3.5	3	4	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7		M4												
	M5 x 0.8		M5												
	D Dimension ±0.25														

TYPE BS04 BLIND THREADED STANDOFFS FOR INSTALLATION INTO STAINLESS STEEL

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 C/L 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

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 ⁽¹⁾										
	M3.5 x 0.6	BS04	M3.5	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7		M4										
	M5 x 0.8		M5										
	F Dimension Min.				3.2	4		5	6.5		9.5		

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

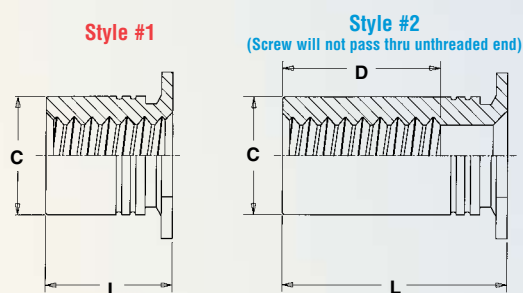
(N/A) Not Available.

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

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

GENERAL DIMENSIONAL DATA

All dimensions are in millimeters.

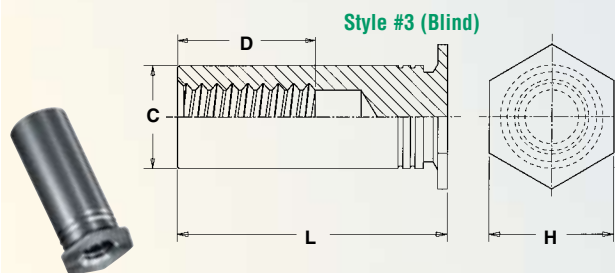


METRIC	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	D Min. Thread Depth	H Nom.	Min. Dist. Hole C/L To Edge
	M25	0.63	4.22	4.19	5.2	4.8	5.8
	6M25	0.63	5.41	5.39		6.4	7.1
	M3	0.63	4.22	4.19	6.2	4.8	5.8
	6M3	0.63	5.41	5.39		6.4	7.1
	M35	0.63	5.41	5.39	7	6.4	7.1

LENGTH / STYLE DATA

All dimensions are in millimeters.

(Length can be specified in .02 mm increments.)



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

THREAD SIZE AND LENGTH SELECTION DATA

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type			Thread Code	Length “L” ±0.08 For other lengths / thread depth data see chart below.										
		Steel	Stainless Steel	Aluminum		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 codes 6M25 and 6M3 offer greater wall thickness for thread sizes M2.5 and M3 respectively.

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

MATERIAL & FINISH SPECIFICATIONS

	Threads ⁽⁵⁾	Fastener Materials					Standard Finishes			For Use In Sheet Hardness: (7)				
Type	Internal, ANSI B1.1 2B ANSI/ASME B1.13M, 6H	Heat-treated Carbon Steel	Non-heat Treated Carbon Steel	7075-T6 Aluminum	300 Series Stainless Steel	400 Series Stainless Steel	Zinc Plated 5µm, Colorless (6)	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	•				•			•				•		
Part Number Codes For Finishes							ZI	None	None					

(5) Where applicable.

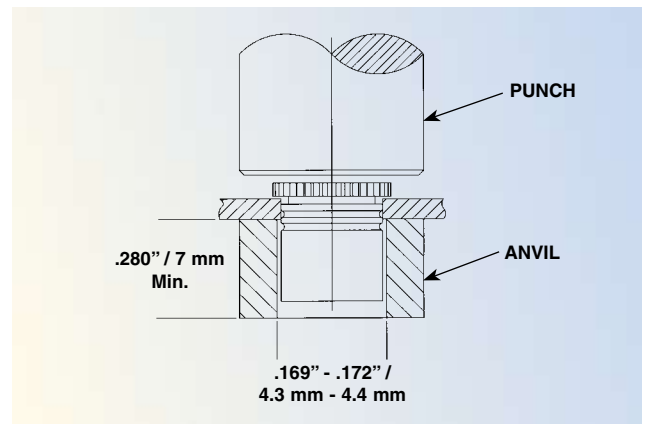
(6) See PEM Technical Support section of our web site for related plating standards and specifications.

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

INSTALLATION

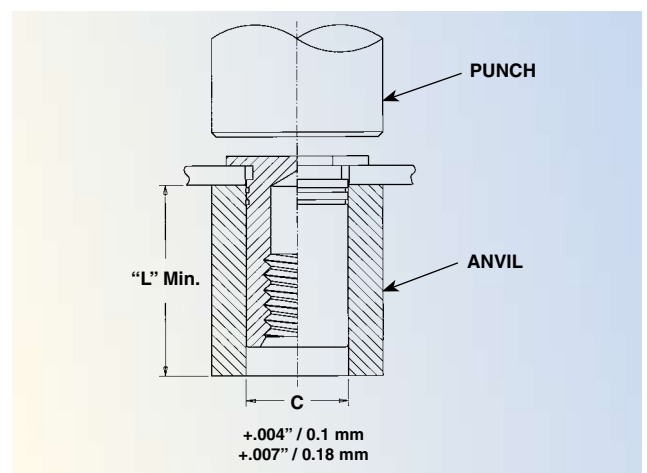
Types DSO and DSOS

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



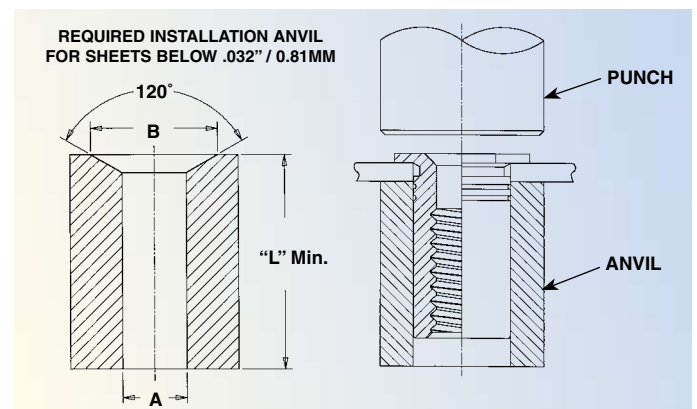
Types SO, SOS, SOA, SO4, BSO, BSOS, BSOA, and BSO4

1. Punch or drill 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, TSOS, and TSOA

1. Punch or drill 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 .025\"/>
- A chamfered anvil is not required for sheets over .032\"/>**



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

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 ⁽¹⁾

Types SO, SOS, SOA, BSO, BSOS, and BSOA

METRIC	Thread Code	Standoff Material	Max. Rec. Tightening Torque For Mating Screw (N•m)	Test Sheet Material							
				1.5 mm 5052-H34 Aluminum				1.5 mm Cold-rolled Steel			
				Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull-thru ⁽²⁾ (N)	Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull-thru ⁽²⁾ (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)	

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, TSOS, and TSOA

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 Cold-rolled Steel			1 mm 5052-H34 Aluminum		
			Installation (kN)	Pushout (N)	Torque-out (N • m)	Installation (kN)	Pushout (N)	Torque-out (N • m)
M3	0.44	5.8	334	1.1	4.5	223	1.1	

(1) The installation, pushout, torque-out and pull-thru 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 .060"/1.5mm will have pull-thru, pushout, and torque-out values at 80% of tabulated values.

(3) Not recommended.

RoHS compliance information can be found on our website.

Specifications subject to change without notice.

Check our website for the most current version of this bulletin.

PennEngineering®



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

CAGE-46384