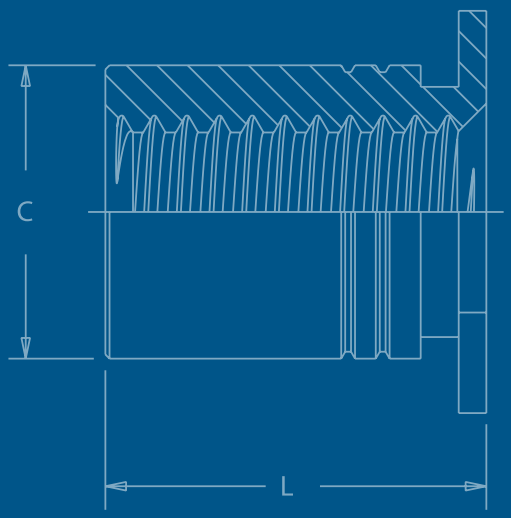
SO™
SELF-CLINCHING STANDOFFS



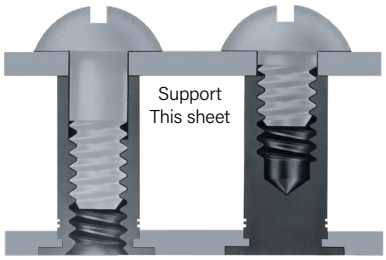
PEM® through hole threaded and unthreaded standoffs for mounting, spacing or stacking panels.

PEM® self-clinching standoffs, which use the proven self-clinching design, provide ideal solutions for applications where mounting, spacing or stacking of panels, boards or components are required. Pressed into round holes, these fasteners mount permanently into metal sheets as thin as .025" / 0.63 mm.

Specially designed SO4™, BSO4™ and TSO4™ standoffs are made from hardened stainless steel and are ideal for clinching into stainless steel sheets. An optional nickel plating is now available if product is expected to be used in a corrosive environment.

For more information on the proper use of PEM® self-clinching standoffs, check our website for Tech Sheet PEM® - REF/Standoff Basics.

Fastener drawings and models are available at www.pemnet.com.
Custom sizes are available on special order. Contact us for more information.



Head Side Of Sheet After Installation

SO/SOS/SOA/SO4
TSO/TSOS/TSOA/TSO4 (Styles 1 & 2)
SOSG/SOAG

BSO/BSOS/BSOA/BSO4
TSO/TSOS/TSOA/TSO4 (Style 3)

DSOS/DSO

SO™/SOS™/SOA™/SO4™ through hole threaded self-clinching standoffs — PAGE 3

BSO™/BSOS™/BSOA™/BSO4™ Blind hole, threaded self-clinching standoffs — PAGE 4

SO™/SOS™/SOA™/SO4™ Through hole, unthreaded self-clinching standoffs — PAGE 5

TSO™/TSOS™/TSOA™/TSO4™ Through hole threaded standoffs **for clinching into thinner sheets** than SO™ standoffs — PAGE 6

DSOS™/DSO™ Through hole, threaded standoffs with round, knurled head **allowing closer-to-edge clinch installation** — PAGE 7

SOSG™/SOAG™ Through hole, threaded grounding standoffs with **"grounding/ earthing teeth" on end of barre**l — PAGE 7

Material and finish specifications — PAGE 8

Installation — PAGE 8-11

Performance data — PAGE 12-13

PEM® Standoff Type	Application Requires:									
	Installation into stainless steel (1)	Superior corrosion resistance	Threads at barrel end	Closed-end for flush appearance	Grounding/ earthing teeth on barrel end	Closest-to-edge distance mounting	Available Unthreaded	Thinnest minimum sheet	Most varied standard length increments	Non-magnetic
BSO			▪	▪						
BSOA			▪	▪						▪
BSOS		▪	▪	▪						▪
BSO4	▪	(2)	▪	▪						
DSO						▪				
DSOS		▪				▪				▪
SO							▪			
SOA							▪			▪
SOS		▪					▪			▪
SO4	▪	(2)					▪			
SOAG					▪					▪
SOSG		▪			▪					▪
TSO			▪	▪ (3)				▪	▪	
TSOA			▪	▪ (3)				▪	▪	▪
TSOS		▪	▪	▪ (3)				▪	▪	▪
TSO4	▪	(2)	▪	▪ (3)				▪	▪	

(1) See note 5 on page 8 about installing fasteners into stainless steel sheets. (2) When used with optional nickel plating. (3) Style #3 only.

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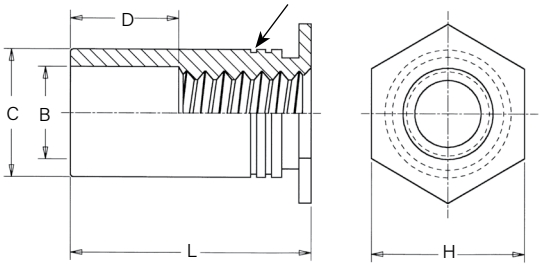
SO™/SOS™/SOA™/SO4™ - Through-Hole Threaded Standoffs

- SO standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 80 / HB (Hardness Brinell) 150 or less.
- SOS standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 70 / HB (Hardness Brinell) 125 or less.
- SOA standoffs are recommended for use in aluminum sheets HRB (Rockwell "B" scale) 50 / HB (Hardness Brinell) 82 or less.
- SO4 standoffs are recommended for use in stainless steel sheets HRB (Rockwell "B" scale) 88 / HB (Hardness Brinell) 183 or less.

PEM® "Single" or PEM® "Two Groove" Registered Trademark



Clinching profile may vary.

SO/SOS/SOA

SO4
Installs into stainless steel

Part Number Designation

SO		- 440	- 8		ZI
SO	S	- 440	- 8		
SO	A	- 440	- 8		
SO	4	- 440	- 8		NC*
↓	↓	↓	↓		↓
Type	Material Code	Thread Code	Length Code		Finish

* NC suffix is required if optional nickel plating (for corrosion resistance) is desired. Otherwise, no suffix is necessary.

General Dimensional Data

All dimensions are in inches.

	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	B Counter-Bore Dia. ±.005	C +.000 -.005	H Nom.	Min. Dist. Hole C/L to Edge (1)	D ±.010
Unified	440	.040	.166	.125	.165	.187	.23	Varies according to length. See length charts below.
	6440	.040	.213	.125	.212	.250	.27	
	632	.040	.213	.156	.212	.250	.27	
	8632	.050	.281	.156	.280	.312	.31	
	832	.050	.281	.188	.280	.312	.31	
	032	.050	.281	.203	.280	.312	.31	

All dimensions are in millimeters.

	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 (1)	D ±0.25
Metric	M3	1	4.22	3.2	4.2	4.8	6	Varies according to length. See length charts below.
	3.5M3	1	5.41	3.2	5.39	6.4	6.8	
	M3.5	1	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	

(1) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

Thread Size And Length Selection Data

Micro sizes also available.
See PEM® Bulletin MPF for more information.

All dimensions are in inches.

	Thread Size	Type: Fastener Material: Steel	Stainless Steel	Aluminum	Hardened Stainless Steel	Thread Code	Length "L" +.002 -.005 (Length Code in 32nds of an inch): .125	.187	.250	.312	.375	.437	.500	.562	.625	.687	.750	.812	.875	.937	1.00	1.062
Unified	.112-40 (#4-40)	SO	SOS	SOA	SO4	440																
						6440(2)	4	6	8	10	12	14	16	18	20	22	24	-	-	-	-	-
	.138-32 (#6-32)	SO	SOS	SOA	SO4	632																
						8632(2)	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
	.164-32 (#8-32)	SO	SOS	SOA	SO4	832	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
	.190-32 (#10-32)	SO	SOS	SOA	SO4	032	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
	D Dimension ±.010						None				.187				.312				.437			

All dimensions are in millimeters.

	Thread Size x Pitch	Type: Fastener Material: Steel	Stainless Steel	Aluminum	Hardened Stainless Steel	Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters): 3	4	6	8	10	12	14	16	18	20	22	25
Metric	M3 x 0.5	SO	SOS	SOA	SO4	M3												
						3.5M3(2)	3	4	6	8	10	12	14	16	18	-	-	-
	M3.5 x 0.6	SO	SOS	SOA	SO4	M3.5	3	4	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7	SO	SOS	SOA	SO4	M4	3	4	6	8	10	12	14	16	18	20	22	25
	M5 x 0.8	SO	SOS	SOA	SO4	M5	3	4	6	8	10	12	14	16	18	20	22	25
	D Dimension ±0.25						None				4			8			11	

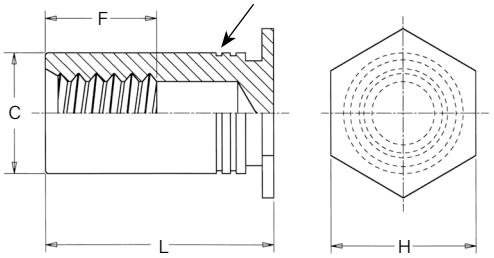
(2) Standoffs with thread codes 6440, 8632, and 3.5M3 have a thicker wall to provide more bearing surface for the mating component or panel reducing the chance of cracking or cutting into the board.

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

BSO™/BSOS™/BSOA™/BSO4™ - Blind Threaded Standoffs

- BSO standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 80 / HB (Hardness Brinell) 150 or less.
- BSOS standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 70 / HB (Hardness Brinell) 125 or less.
- BSOA standoffs are recommended for use in aluminum sheets HRB (Rockwell "B" scale) 50 / HB (Hardness Brinell) 82 or less.
- BSO4 standoffs are recommended for use in stainless steel sheets HRB (Rockwell "B" scale) 88 / HB (Hardness Brinell) 183 or less.

PEM® "Single" or PEM® "Two Groove" Registered Trademark



Clinching profile may vary.

BSO/BSOS/BSOA

BSO4
Installs into stainless steel

PART NUMBER DESIGNATION

BSO		-	440	-	12	ZI
BSO	S	-	440	-	12	
BSO	A	-	440	-	12	
BSO	4	-	440	-	12	NC*
↓	↓		↓		↓	↓
Type	Material Code		Thread Code		Length Code	Finish

* NC suffix is required if optional nickel plating (for corrosion resistance) is desired. Otherwise, no suffix is necessary.

General Dimensional Data

All dimensions are in inches.

	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C +.000 -.005	H Nom.	Min. Dist. Hole C/L to Edge (1)	F Min.
Unified	440	.040	.166	.165	.187	.23	Varies according to length. See length charts below.
	6440	.040	.213	.212	.250	.27	
	632	.040	.213	.212	.250	.27	
	8632	.050	.281	.280	.312	.31	
	832	.050	.281	.280	.312	.31	
	032	.050	.281	.280	.312	.31	

All dimensions are in millimeters.

	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	H Nom.	Min. Dist. Hole C/L to Edge (1)	F Min.
Metric	M3	1	4.22	4.2	4.8	6	Varies according to length. See length charts below.
	3.5M3	1	5.41	5.39	6.4	6.8	
	M3.5	1	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	

(1) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

Thread Size And Length Selection Data

All dimensions are in inches.

	Thread Size	Type				Thread Code	Length "L" +.002 -.005 (Length Code in 32nds of an inch)												
		Steel	Stainless Steel	Aluminum	Hardened Stainless Steel		.312	.375	.437	.500	.562	.625	.687	.750	.812	.875	.937	1.00	1.062
Unified	.112-40 (#4-40)	BSO	BSOS	BSOA	BSO4	440	10	12	14	16	18	20	22	24	26	28	30	32	34
						6440(2)													
	.138-32 (#6-32)	BSO	BSOS	BSOA	BSO4	632	10	12	14	16	18	20	22	24	26	28	30	32	34
						8632(1)													
	.164-32 (#8-32)	BSO	BSOS	BSOA	BSO4	832	10	12	14	16	18	20	22	24	26	28	30	32	34
	.190-32 (#10-32)	BSO	BSOS	BSOA	BSO4	032	10	12	14	16	18	20	22	24	26	28	30	32	34
	F Dimension Min.						.156		.187	.250			.375						

All dimensions are in millimeters.

	Thread Size x Pitch	Type				Thread Code	Length "L" +0.05 -0.13 (Length Code in millimeters)									
		Steel	Stainless Steel	Aluminum	Hardened Stainless Steel		6	8	10	12	14	16	18	20	22	25
Metric	M3 x 0.5	BSO	BSOS	BSOA	BSO4	M3										
						3.5M3(2)										
	M3.5 x 0.6	BSO	BSOS	BSOA	BSO4	M3.5	6	8	10	12	14	16	18	20	22	25
	M4 x 0.7	BSO	BSOS	BSOA	BSO4	M4	6	8	10	12	14	16	18	20	22	25
	M5 x 0.8	BSO	BSOS	BSOA	BSO4	M5	6	8	10	12	14	16	18	20	22	25
	F Dimension Min.						3.2	4		5	6.5		9.5			

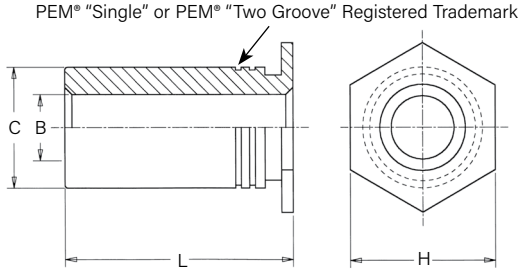
(2) Standoffs with thread codes 6440, 8632, and 3.5M3 have a thicker wall to provide more bearing surface for the mating component or panel reducing the chance of cracking or cutting into the board.

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

SO™/SOS™/SOA™/SO4™ - Through-Hole Unthreaded Standoffs (Special Order)

- SO standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 80 / HB (Hardness Brinell) 150 or less.
- SOS standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 70 / HB (Hardness Brinell) 125 or less.
- SOA standoffs are recommended for use in aluminum sheets HRB (Rockwell "B" scale) 50 / HB (Hardness Brinell) 82 or less.
- SO4 standoffs are recommended for use in stainless steel sheets HRB (Rockwell "B" scale) 88 / HB (Hardness Brinell) 183 or less.

PEM® "Single" or PEM® "Two Groove" Registered Trademark



Clinching profile may vary.

SO/SOS/SOA

SO4
Installs into stainless steel

Part Number Designation

SO		- 4116 -	8		ZI
SO	S	- 4116 -	8		
SO	A	- 4116 -	8		
SO	4	- 4116 -	8		NC*
Type	Material Code		Thru-hole Code	Length Code	Finish

* NC suffix is required if optional nickel plating (for corrosion resistance) is desired. Otherwise, no suffix is necessary.

General Dimensional Data

All dimensions are in inches.

	Thru-hole Code	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C +.000 -.005	H Nom.	Min. Dist. Hole C/L to Edge (1)
Unified	4116	.040	.166	.165	.187	.23
	6116	.040	.213	.212	.250	.27
	6143	.040	.213	.212	.250	.27
	8143	.050	.281	.280	.312	.31
	8169	.050	.281	.280	.312	.31
	8194	.050	.281	.280	.312	.31

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 (1)
Metric	43.1	1	4.22	4.2	4.8	6
	63.1	1	5.41	5.39	6.4	6.8
	63.6	1	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

(1) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

Micro sizes also available.
See PEM® Bulletin MPF for more information.

Through-Hole And Length Selection Data

All dimensions are in inches.

	B Thru-hole Diameter +.004 -.003	Type				Thru-hole Code	Length "L" +.002 -.005 (Length Code in 32nds of an inch)										
		Steel	Stainless Steel	Aluminum	Hardened Stainless Steel		.125	.187	.250	.312	.375	.437	.500	.562	.625	.687	.750
Unified	.116	SO	SOS	SOA	SO4	4116	4	6	8	10	12	14	16	18	20	22	24
						6116(2)											
	.143	SO	SOS	SOA	SO4	6143	4	6	8	10	12	14	16	18	20	22	24
						8143(2)											
	.169	SO	SOS	SOA	SO4	8169	4	6	8	10	12	14	16	18	20	22	24
	.194	SO	SOS	SOA	SO4	8194	4	6	8	10	12	14	16	18	20	22	24

All dimensions are in millimeters.

	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	Hardened Stainless Steel											
Metric	3.1	SO	SOS	SOA	SO4	43.1	3	4	6	8	10	12	14	16	18	20
						63.1(2)										
	3.6	SO	SOS	SOA	SO4	63.6	3	4	6	8	10	12	14	16	18	20
						83.6(2)										
	4.1	SO	SOS	SOA	SO4	84.1	3	4	6	8	10	12	14	16	18	20
	5.1	SO	SOS	SOA	SO4	85.1	3	4	6	8	10	12	14	16	18	20

(2) Standoffs with thru-hole codes 6116, 8143, 63.1 and 83.6 have a thicker wall to provide more bearing surface for the mating component or panel reducing the chance of cracking or cutting into the board.

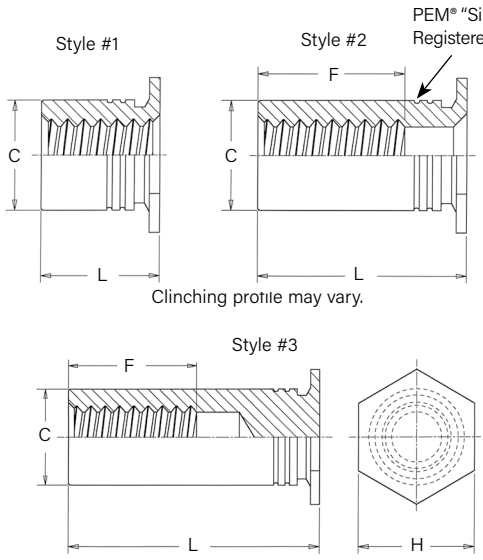
Please contact your local PEM® distributor for availability, minimum quantity, and pricing information.

TSO™/TSOS™/TSOA™/TSO4™ Threaded Standoffs For Sheets As Thin As .025"/0.63mm

- TSO standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 60 / HB (Hardness Brinell) 107 or less.
- TSOS standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 70 / HB (Hardness Brinell) 125 or less.
- TSOA standoffs are recommended for use in aluminum sheets HRB (Rockwell "B" scale) 50 / HB (Hardness Brinell) 82 or less.
- TSO4 standoffs are recommended for use in stainless steel sheets HRB (Rockwell "B" scale) 88 / HB (Hardness Brinell) 183 or less.

TSO/TSOS/TSOA

TSO4
Installs into
stainless steel



General Dimensional Data

All dimensions are in inches.

	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C +.000 -.005	F Min. Thread Depth	H Nom.	Min. Dist. Hole C/L to Edge (5)
Unified	256	.025	.166	.165	.200	.187	.23
	6256	.025	.213	.212		.250	.27
	440	.025	.166	.165	.220	.187	.23
	6440	.025	.213	.212		.250	.27
	632	.025	.213	.212	.270	.250	.27

All dimensions are in millimeters.

	Thread Code	Min. Sheet Thickness	Hole Size In Sheet +0.08	C -0.13	F Min. Thread Depth	H Nom.	Min. Dist. Hole C/L to Edge (5)
Metric	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

(5) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

Thread Size And Length Selection Data

All dimensions are in inches.

	Thread Size	Type				Thread Code	Length "L" ±.003 For other lengths / thread depth data see chart at bottom of page.											
		Steel	Stainless Steel	Aluminum	Hardened Stainless Steel		.090	.125	.187	.250	.312	.375	.437	.500	.562	.625	.687	.750
							Length Code (Length "L" without decimal point)											
Unified	.086-56 (#2-56)	TSO	TSOS	TSOA	TSO4	256 / 6256(4)	090(1)	125(1)	187(1)	250(1)	312(2)	375(2)	437(3)	500(3)	562(3)	625(3)	687(3)	750(3)
	.112-40 (#4-40)	TSO	TSOS	TSOA	TSO4	440 / 6440(4)	090(1)	125(1)	187(1)	250(1)	312(2)	375(2)	437(2)	500(3)	562(3)	625(3)	687(3)	750(3)
	.138-32 (#6-32)	TSO	TSOS	TSOA	TSO4	632	-	125(1)	187(1)	250(1)	312(1)	375(2)	437(2)	500(2)	562(3)	625(3)	687(3)	750(3)

All dimensions are in millimeters.

	Thread Size x Pitch	Type				Thread Code	Length "L" ±0.08 For other lengths / thread depth data see chart at bottom of page.										
		Steel	Stainless Steel	Aluminum	Hardened Stainless Steel		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)										
Metric	M2.5 x 0.45	TSO	TSOS	TSOA	TSO4	M25 / 6M25(4)	200(1)	300(1)	400(1)	600(1)	800(2)	1000(3)	1200(3)	1400(3)	1600(3)	1800(3)	1900(3)
	M3 x 0.5	TSO	TSOS	TSOA	TSO4	M3 / 6M3(4)	200(1)	300(1)	400(1)	600(1)	800(2)	1000(2)	1200(3)	1400(3)	1600(3)	1800(3)	1900(3)
	M3.5 x 0.6	TSO	TSOS	TSOA	TSO4	M35	-	300(1)	400(1)	600(1)	800(1)	1000(2)	1200(2)	1400(3)	1600(3)	1800(3)	1900(3)

(1) Style #1. Thru-threaded.
(2) Style #2. Screw might not pass through unthreaded end. Tapped to minimum full thread depth shown. Incomplete threads on tap may allow screw to pass through.
(3) Style #3. Blind.
(4) Standoffs with thread codes 6256, 6440, 6M25 and 6M3 have a thicker wall to provide more bearing surface for the mating component or panel reducing the chance of cracking or cutting into the board.

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

LENGTH/STYLE DATA

All dimensions are in inches.
(Length can be specified in .001" increments.)

	Thread Code	Length "L" (Style #1)	Length "L" (Style #2)	Length "L" (Style #3)
Unified	256 / 6256	.090 - .250	.251 - .375	.376 - .750
	440 / 6440	.090 - .280	.281 - .450	.451 - .750
	632	.120 - .350	.351 - .540	.541 - .750

All dimensions are in millimeters.
(Length can be specified in 0.02 mm increments.)

	Thread Code	Length "L" (Style #1)	Length "L" (Style #2)	Length "L" (Style #3)
Metric	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

TSO		-	440	-	250	ZI
TSO	S	-	440	-	250	
TSO	A	-	440	-	250	
TSO	4	-	440	-	250	NC*
↓	↓		↓		↓	↓
Type	Material Code		Thread Code		Length Code	Finish

* NC suffix is required if optional nickel plating (for corrosion resistance) is desired. Otherwise, no suffix is necessary.

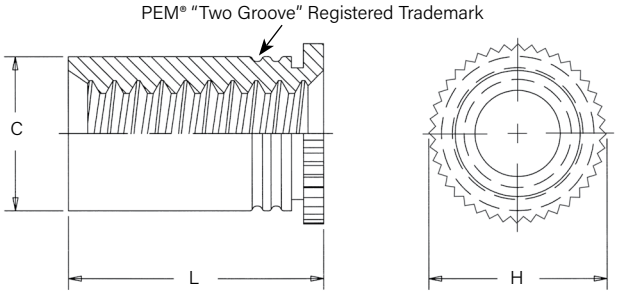
DSOS™/DSO™ Threaded Standoffs - For Close-To-Edge Applications

- DSO standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 80 / HB (Hardness Brinell) 150 or less.
- DSOS standoffs are recommended for use in steel or aluminum sheets HRB (Rockwell "B" scale) 70 / HB (Hardness Brinell) 125 or less.

Part Number Designation

DSO S - 440 - 250
DSO - 440 - 250 ZI

Type | Material Code | Thread Code | Length Code | Finish



Clinching profile may vary.

All dimensions are in inches.

	Thread Size	Type		Thread Code	Length Code	Sheet Thickness	Hole Size In Sheet +.003 -.000	C Max.	H Nom.	L +.002 -.005 (1)	Min. Dist. Hole C/L to Edge (2)
		Stainless Steel	Steel								
Unified	.112-40 (#4-40)	DSOS	DSO	440	250	.037 - .250	.166	.165	.194	.250	.126
					275					.275	

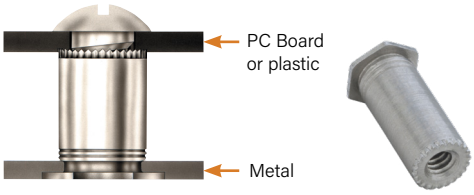
All dimensions are in millimeters.

	Thread Size x Pitch	Type		Thread Code	Length Code	Sheet Thickness	Hole Size In Sheet +0.08	C Max.	H Nom.	L +0.05 -0.13 (1)	Min. Dist. Hole C/L to Edge (2)
		Stainless Steel	Steel								
Metric	M3 x 0.5	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.
(2) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

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

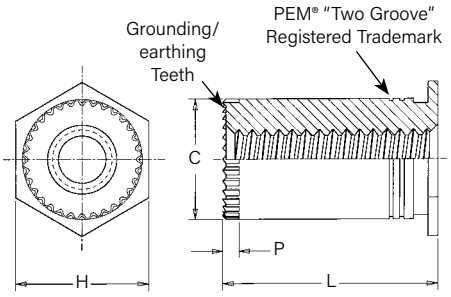
SOSG™/SOAG™ Grounding/Earthing Standoffs



Part Number Designation

SO S G - 6440 - 10
SO A G - 6440 - 10

Type | Material Code | Grounding/ Earthing | Thread Code | Length Code



Clinching profile may vary.

All dimensions are in inches.

	Thread Size	Type		Thread Code	Length "L" +.010 -.000 (Length Code is in 32nds of an inch)							Min. Sheet Thick-ness	Hole Size In Sheet +.003 -.000	C +.000 -.005	H ±.005	P Nom.	Min. Dist. Hole C/L to Edge (2)
		Stainless Steel	Aluminum		.125	.187	.250	.312	.375	.437	.500						
Unified	.112-40 (#4-40)	SOSG	SOAG	6440	4	6	8	10	12	14	16	.040	.213	.212	.250	.030	.27
	.138-32 (#6-32)	SOSG	SOAG	8632	4	6	8	10	12	14	16	.050	.281	.280	.312	.030	.31

All dimensions are in millimeters.

	Thread Size x Pitch	Type		Thread Code	Length "L" +0.25 (Length Code is in millimeters)						Min. Sheet Thick-ness	Hole Size In Sheet +0.08	C -0.13	H ±0.25	P Nom.	Min. Dist. Hole C/L to Edge (2)
		Stainless Steel	Aluminum													
Metric	M3 x 0.5	SOSG	SOAG	3.5M3	3	4	6	8	10	12	1	5.4	5.39	6.4	0.76	6.8

(2) For more information on proximity to bends and distance to other clinch hardware, see PEM® Tech Sheet C/L To Edge.

Material And Finish Specifications

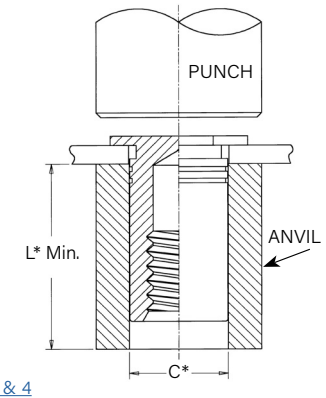
	Threads [1]	Fastener Materials					Standard Finishes			Optional Finish	For Use In Sheet Hardness: [4]				
Type	Internal, ASME B1.1, 2B ASME B1.13M, 6H	Hardened Carbon Steel	Non-heat Treated Carbon Steel	Aluminum	300 Series Stainless Steel	Hardened 400 Series Stainless Steel (5)	Zinc Plated per ASTM B633, SC1 (5µm), Type III Colorless (2)	Passivated and/or Tested Per ASTM A380	No Finish	Electroless Nickel over Copper over Nickel Strike Per ASTM B733 (2) (3)	HRB 88 / HB 183 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	▪			▪					▪						▪
TSO4	▪					▪		▪		▪	▪				
DSO	▪	▪					▪					▪			
DSOS	▪				▪			▪					▪		
SOAG	▪			▪					▪						▪
SOSG	▪				▪			▪					▪		
Part Number Codes For Finishes							ZI	None	None	NC					

(1) Where applicable.
(2) See PEM Technical Support section of our website for related plating standards and specifications.
(3) Not stocked, available on special order. Minimum quantities apply. Contact your local PEM® distributor for details.
(4) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.
(5) In order for self-clinching fasteners to work properly, the fastener must be harder than the sheet into which it is being installed (For more information, see our tech sheet for installing fasteners into stainless steel sheets). In the case of stainless steel panels, fasteners made from 300 Series Stainless Steel do not meet this hardness criteria. It is for this reason that SO4™, BSO4™ and TSO4™ 400 series fasteners are offered. However, while these 400 Series fasteners install and perform well in 300 Series stainless sheets they should not be used if the end product will be exposed to any appreciable corrosive environment (unless finished with optional nickel plating), requires non-magnetic fasteners or will be exposed to any temperatures above 300˚F (149˚C). If any of the these are issues, please contact techsupport@pemnet.com for other options.

Installation

SO™/SOS™/SOA™/SO4™/BSO™/BSOS™/BSOA™/BSO4™ Standoffs

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operation such as deburring.
2. Insert standoff through mounting hole (preferably the punch side) of sheet and into anvil as shown in drawing.
3. With installation 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.



*See page 3 & 4 for "C" and "L".

+.004" to +.007" / +0.1 mm to +0.18 mm

Installation Tooling

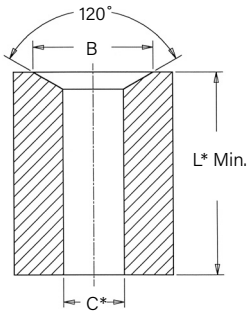
Thread Code	HAEGER® Part No.		PEMSERTER® Part Number	
	Anvil	Punch	Anvil	Punch
440/M2/M2.5/M3	H-109-4/M3L	H-108-0020L	970200487300	975200048
632/6440/3.5M3/M3.5	H-109-6/M3.5L	H-108-0020L	970200012300	975200048
832/8632/032/M4/M5	H-109-8-10/M5L	H-108-0020L	970200013300	975200048
0420/M6	H-109-04/M6L	H-108-0020L	970200393300	975200048

Installation

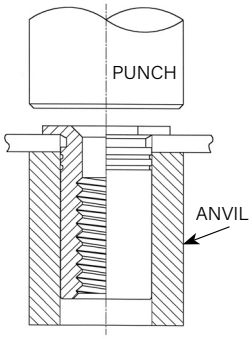
TSO™/TSOS™/TSOA™/TSO4™ Standoffs

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operation such as deburring.
2. Insert standoff through mounting hole (preferably the punch side) of sheet and into anvil as shown in drawing.
3. With installation 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" to .032" / 0.63 mm to 0.81 mm. A chamfered anvil is not required for sheets over .032" / 0.81 mm.

Required Installation Anvil For Sheets Below .032" / 0.81 mm



+.001" to +.004" / +0.03 mm to +0.1 mm



*See page 6 for "C" and "L".

Installation Tooling

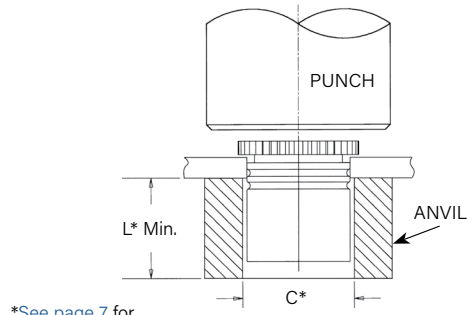
	Thread Code	HAEGER® Part Numbers				PEMSERTER® Part Numbers			
		Anvil Dimensions (in.) For Sheets Below .032"		Anvil For sheets Over .032"	Punch	Anvil Dimensions (in.) For Sheets Below .032"		Anvil For Sheets Over .032"	Punch
		B	Anvil			B	Anvil		
Unified	256/440	(1)	(1)	H-109-4/M3L	H-108-0020L	.187 - .194	8003291	970200487300	975200048
	6256/6440/632	(1)	(1)	H-109-6/M3.5L	H-108-0020L	.250 - .257	8003292	970200012300	975200048

	Thread Code	HAEGER® Part Numbers				PEMSERTER® Part Numbers			
		Anvil Dimensions (mm) For Sheets Below 0.81 mm		Anvil For sheets Over 0.81 mm	Punch	Anvil Dimensions (mm) For Sheets Below 0.81 mm		Anvil For Sheets Over 0.81 mm	Punch
		B	Anvil			B	Anvil		
Metric	M2.5/M3	(1)	(1)	H-109-4/M3L	H-108-0020L	4.75 - 4.93	8003291	970200487300	975200048
	6M25/6M3/M35	(1)	(1)	H-109-6/M3.5L	H-108-0020L	6.35 - 6.53	8003292	970200012300	975200048

(1) Click here for a quote on Haeger® custom anvil installation tooling.

DSOS™/DSO™ Standoffs

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



*See page 7 for "C" and "L".

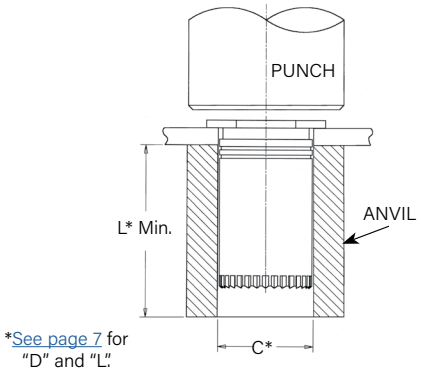
+.004" to +.007" / +0.1 mm to +0.18 mm

Installation Tooling

Thread Code	HAEGER® Part No.		PEMSERTER® Part Number	
	Anvil	Punch	Anvil	Punch
440/M3	H-109-4/M3L	H-108-0020L	970200487300	975200048
6440/3.5M3	H-109-6/M3.5L	H-108-0020L	970200012300	975200048
8632	H-109-8-10/M5L	H-108-0020L	970200013300	975200048

SOSG™/SOAG™ Standoffs

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



*See page 7 for "D" and "L".

+.004" to +.007" / +0.1 mm to +0.18 mm

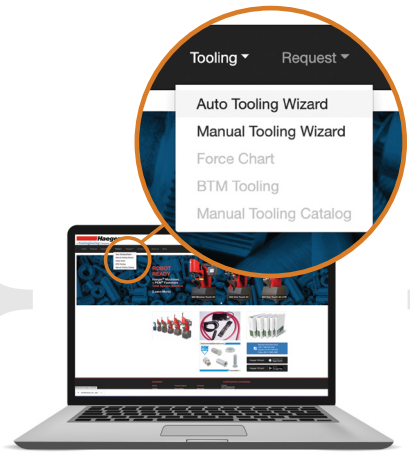
PEMSERTER® Installation Tooling

Thread Code	HAEGER® Part No.		PEMSERTER® Part Number	
	Anvil	Punch	Anvil	Punch
440/M3	H-109-4/M3L	H-108-0020L	970200487300	975200048
6440/3.5M3	H-109-6/M3.5L	H-108-0020L	970200012300	975200048
8632	H-109-8-10/M5L	H-108-0020L	970200013300	975200048

Installation Notes

- For best results we recommend using a Haeger® or PEMSERTER® press for installation of PEM® standoffs. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process for this product.

For Additional HAEGER® and PEMSERTER® Tooling Information / Part Numbers



Go to haeger.com to access
the Auto and Manual Tooling Wizards

HAEGER® MANUAL TOOLING CATALOG

HAEGER® AUTO TOOLING CATALOG

Or download the
HAEGER WIZZARD Phone App

PEMSERTER® MANUAL TOOLING CATALOG

PEMSERTER® AUTO TOOLING CATALOG

Performance Data[1]

SO™/SOS™/SOA™/BSO™/BSOS™/BSOA™ Standoffs

	Thread Code	Standoff Material	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Test Sheet Material [2]							
				.060" 5052-H34 Aluminum				.060" Cold-rolled Steel			
				Installation (lbs.)	Pushout (lbs.)	Torque-out [3] (in. lbs.)	Pull-thru [3] (lbs.)	Installation (lbs.)	Pushout (lbs.)	Torque-out [3] (in. lbs.)	Pull-thru [3] (lbs.)
Unified	440	Steel	4.75	1100	160	11	280	2200	225	19	330
		Stainless Steel	3.8	1100	160	11	224	2200	225	19	264
		Aluminum	2.85	1100	160	11	168	–	–	–	–
	6440	Steel	4.75	1700	300	25	310	3300	420	35	380
		Stainless Steel	3.8	1700	300	25	248	3300	420	35	304
		Aluminum	2.85	1700	300	25	186	–	–	–	–
	632	Steel	8.75	1700	300	25	310	3300	420	35	380
		Stainless Steel	7	1700	300	25	248	3300	420	35	304
		Aluminum	5.25	1700	300	25	186	–	–	–	–
	8632	Steel	8.75	2400	400	45	580	4000	560	75	700
		Stainless Steel	7	2400	400	45	464	4000	560	75	560
		Aluminum	5.25	2400	400	45	248	–	–	–	–
	832	Steel	18	2400	400	45	580	4000	560	75	700
		Stainless Steel	14.4	2400	400	45	464	4000	560	75	560
		Aluminum	11	2400	400	45	348	–	–	–	–
	032	Steel	32	2400	400	45	580	4000	560	75	700
		Stainless Steel	25.6	2400	400	45	464	4000	560	75	560
		Aluminum	19	2400	400	45	348	–	–	–	–

	Thread Code	Standoff Material	Max. Rec. Tightening Torque For Mating Screw (N·m)	Test Sheet Material [2]							
				1.5 mm 5052-H34 Aluminum				1.5 mm Cold-rolled Steel			
				Installation (kN)	Pushout (N)	Torque-out [3] (N·m)	Pull-thru [3] (N)	Installation (kN)	Pushout (N)	Torque-out [3] (N·m)	Pull-thru [3] (N)
Metric	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	–	–	–	–
	3.5M3	Steel	0.55	7.6	1330	2.82	1375	14.7	1860	3.95	1690
		Stainless Steel	0.44	7.6	1330	2.82	1100	14.7	1860	3.95	1352
		Aluminum	0.33	7.6	1330	2.82	825	–	–	–	–
	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	–	–	–	–
	M4	Steel	2	10.7	1780	5.08	2575	17.8	2490	8.47	3110
		Stainless Steel	1.6	10.7	1780	5.08	2060	17.8	2490	8.47	2488
		Aluminum	1.2	10.7	1780	5.08	1545	–	–	–	–
	M5	Steel	3.6	10.7	1780	5.08	2575	17.8	2490	8.47	3110
		Stainless Steel	2.88	10.7	1780	5.08	2060	17.8	2490	8.47	2488
		Aluminum	2.16	10.7	1780	5.08	1545	–	–	–	–

SO4™/BSO4™ Standoffs

	Thread Code	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Test Sheet Material			
			.050" 300 Series Stainless Steel			
			Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.) (3)	Pull-thru (lbs.) (3)
Unified	440	4.75	5500	336	17	600
	6440	4.75	9500	647	30	680
	632	8.75	9500	647	30	680
	8632	8.75	10500	900	71	1392
	832	18	10500	900	71	1517
	032	32	10500	900	71	1368

	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) (3)	Pull-thru (N) (3)
Metric	M3	0.55	24.5	1493	2.36	2650
	3.5M3	0.55	42.3	2877	3.06	3025
	M3.5	0.91	42.3	2877	3.06	3025
	M4	2	46.7	4003	8.89	6458
	M5	3.6	46.7	4003	8.89	6226

(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) See tech sheet on our website for performance data of PEM® Type SO™ standoffs installed into copper sheets.

(3) Joint failure in torque-out and pull-thru will depend on the strength and type of screw being used. In some cases the failure will be in the screw and not in the self-clinching standoff. Please contact our Applications Engineering group with any questions.

Performance Data[1]

TSO™/TSOS™/TSOA™ Standoffs

Standoff "C" Dimension	Standoff Material	Test Sheet Material															
		.025" / 0.64 mm 5052-H34 Aluminum								.025" / 0.64 mm Cold-rolled Steel							
		Installation		Pushout		Torque-out [2]		Pull-thru [2]		Installation		Pushout		Torque-out [2]		Pull-thru [2]	
		(lbs.)	(kN)	(lbs.)	(N)	(in. lbs.)	(N·m)	(lbs.)	(N)	(lbs.)	(kN)	(lbs.)	(N)	(in. lbs.)	(N·m)	(lbs.)	(N)
.165" / 4.2 mm	Steel	700	3.1	70	311	6	0.68	230	1022	1100	4.9	100	445	9	1	206	916
	Stainless Steel	700	3.1	70	311	6	0.68	268	1191	1100	4.9	100	445	9	1	260	1155
	Aluminum	700	3.1	70	311	6	0.68	227	1009	—	—	—	—	—	—	—	—
.212" / 5.39 mm	Steel	700	3.1	90	400	11	1.24	264	1173	1800	8	150	667	15	1.7	207	920
	Stainless Steel	700	3.1	90	400	11	1.24	340	1511	1800	8	150	667	15	1.7	344	1529
	Aluminum	700	3.1	90	400	11	1.24	300	1333	—	—	—	—	—	—	—	—

TSO4™ Standoffs

Standoff "C" Dimension	Test Sheet Material							
	.025" / 0.64 mm 300 series stainless steel							
	Installation		Pushout		Torque-out [2]		Pull-thru [2]	
	(lbs.)	(kN)	(lbs.)	(N)	(in. lbs.)	(N·m)	(lbs.)	(N)
.165" / 4.2 mm	6500	28.9	125	555	13	1.5	414	1840
.212" / 5.39 mm	6800	30.3	160	710	22	2.5	552	2453

DSOS™/DSO™ Standoffs

	Thread Code	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Test Sheet Material							
			.040" 5052-H34 Aluminum				.040" Cold-rolled Steel			
			Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.) [2]	Pull-thru (lbs.) [2]	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.) [2]	Pull-thru (lbs.) [2]
Unified	440	3.8	700	50	10	320	1100	75	10	357

	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) [2]	Pull-thru (N) [2]	Installation (kN)	Pushout (N)	Torque-out (N·m) [2]	Pull-thru (N) [2]
Metric	M3	0.44	3.1	223	1.1	1422	4.9	334	1.1	1587

SOSG™/SOAG™ Standoffs

	Thread Code	Test Sheet Thickness and Test Sheet Material	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.) [2]	Pull-thru (lbs.) [2]
Unified	6440	.064" 5052-H34 Aluminum	1700	300	25	186
	8632	.064" 5052-H34 Aluminum	1700	400	45	248

	Thread Code	Test Sheet Thickness and Test Sheet Material	Installation (kN)	Pushout (N)	Torque-out (N·m) (2)	Pull-thru (N) [2]
Metric	3.5M3	1.6 mm 5052-H34 Aluminum	7.6	1330	2.82	825

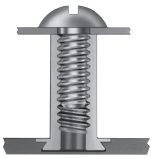
(1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and 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) Joint failure in torque-out and pull-thru will depend on the strength and type of screw being used. In some cases the failure will be in the screw and not in the self-clinching standoff. Please contact our Applications Engineering group with any questions.

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

CH Datasheet

PEM® concealed-head standoffs.



SSA Datasheet

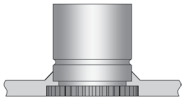
PEM® SNAP-TOP® standoffs.

K Datasheet

PEM® broaching and surface mount standoffs for printed circuit boards.

MPF Datasheet

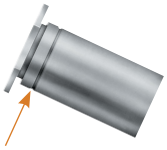
microPEM® standoffs.



SK Datasheet

PEM® KEYHOLE® standoffs.

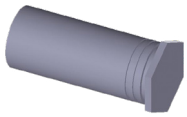
For more information on how to use PEM® self-clinching standoffs, see Tech Sheet "PEM®-Ref/Standoff Basics" on our web site.



PEM® "Single Groove"
(Registered trademark)
Parts that install into stainless steel sheets

PEM® "Two Groove"
(Registered trademark)

Due to differences in manufacturing methods, location of grooves and surface appearance on barrel of actual parts may be different than shown in photo.



Fastener drawings and models are available at www.pemnet.com

Custom sizes are available on special order. Contact us for more information.

All PEM® products meet our stringent quality standards. If you require additional industry or other specific quality certifications, special procedures and/or part numbers are required. Please contact your local sales office or representative for further information.

Regulatory compliance information is available in Technical Support section of our website. Specifications subject to change without notice. See our website for the most current version of this bulletin.

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