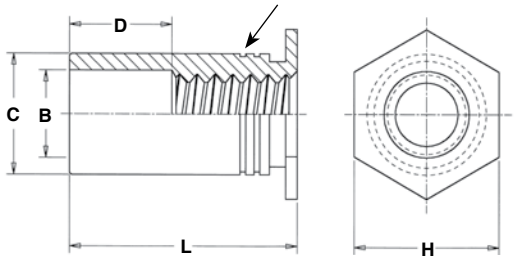
TYPES SO/SOS/SOA/SO4 - THROUGH-HOLE THREADED STANDOFFS

"Single" or "Two Groove" Registered Trademark



Clinching profile may vary.

Types SO/SOS/SOA

Type SO4
Installs into stainless steel

PART NUMBER DESIGNATION

SO		– 440	– 8	ZI
SO	S	– 440	– 8	
SO	A	– 440	– 8	
SO	4	– 440	– 8	
Type	Material Code	Thread Code	Length Code	Finish

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 ℄ To Edge	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 ℄ To Edge	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	

THREAD SIZE AND LENGTH SELECTION DATA

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(1)	4	6	8	10	12	14	16	18	20	22	24	–	–	–	–	–
	.138-32 (#6-32)	SO	SOS	SOA	SO4	632 / 8632(1)	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.

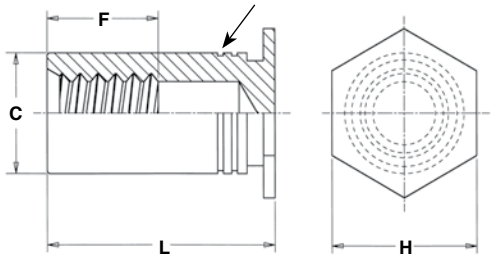
	Thread Size x Pitch	Type – Fastener Material: Steel	Stainless Steel	Aluminum	Hardened Stainless Steel	Thread Code	Length "L" +0.05 –0.13 (Length Code in millimeters) 3	4	6	8	10	12	14	16	18	20	22	25
METRIC	M3 x 0.5	SO	SOS	SOA	SO4	M3 / 3.5M3(1)	3	4	6	8	10	12	14	16	18	–	–	–
	M3.5 x 0.6	SO	SOS	SOA	SO4	M3.5	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	

(1) 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.

TYPES BSO/BSOS/BSOA/BSO4 - BLIND THREADED STANDOFFS

"Single" or "Two Groove" Registered Trademark



Clinching profile may vary.

Types BSO/BSOS/BSOA

Type BSO4
Installs into stainless steel

PART NUMBER DESIGNATION

BSO		– 440	– 12	ZI
BSO	S	– 440	– 12	
BSO	A	– 440	– 12	
BSO	4	– 440	– 12	
Type	Material Code	Thread Code	Length Code	Finish

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 ℄ To Edge	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 ℄ To Edge	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	

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(1)													
	.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						

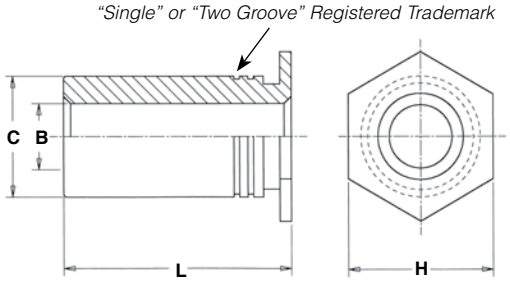
All dimensions are in millimeters.

	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(1)										
	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			

(1) 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.

TYPES SO/SOS/SOA/SO4 - THROUGH-HOLE UNTHREADED STANDOFFS



Clinching profile may vary.

Types SO/SOS/SOA

Type SO4
Installs into stainless steel

PART NUMBER DESIGNATION

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

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 ℄ To Edge
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 ℄ To Edge
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

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

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(1)											
	.143	SO	SOS	SOA	SO4	6143	4	6	8	10	12	14	16	18	20	22	24
						8143(1)											
	.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		3	4	6	8	10	12	14	16	18	20
METRIC	3.1	S0	SOS	SOA	SO4	43.1	3	4	6	8	10	12	14	16	18	20
						63.1(1)										
	3.6	S0	SOS	SOA	SO4	63.6	3	4	6	8	10	12	14	16	18	20
						83.6(1)										
	4.1	S0	SOS	SOA	SO4	84.1	3	4	6	8	10	12	14	16	18	20
	5.1	S0	SOS	SOA	SO4	85.1	3	4	6	8	10	12	14	16	18	20

(1) 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.

MATERIAL AND FINISH SPECIFICATIONS

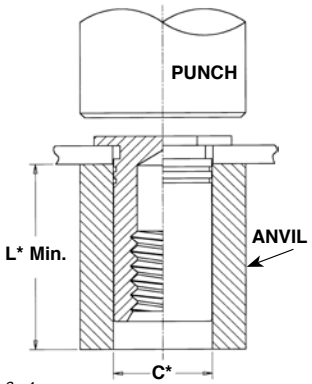
	Threads (1)	Fastener Materials					Standard Finishes			For Use In Sheet Hardness: (3)				
Type	Internal, ASME B1.1, 2B ASME B1.13M, 6H	Hardened Carbon Steel	Non-heat Treated Carbon Steel	Aluminum	300 Series Stainless Steel	Heat-Treated 400 Series Stainless Steel	Zinc Plated 5µm, Colorless (2)	Passivated and/or Tested Per ASTM A380	No Finish	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 89 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					

(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/SOS/SOA/SO4/BSO/BSOS/BSOA/BSO4

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 pages 3 & 4 for "C" and "L".

PEMSERTER® Installation Tooling

Thread Code	Anvil Part Number	Punch Part Number
440/M2/M2.5/M3	970200487300	975200048
632/6440/3.5M3/M3.5	970200012300	
832/8632/M4	970200013300	
032/M5	970200013300	
0420/M6	970200393300	

PERFORMANCE DATA(1)

TYPES SO/SOS/SOA/BSO/BSOS/BSOA

	Thread Code	Standoff Material	Max. Rec. Tightening Torque For Mating Screw (in. lbs.)	Test Sheet Material							
				.060" 5052-H34 Aluminum				.060" 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	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							
				1.5 mm 5052-H34 Aluminum				1.5 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	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	–	–	–	–

TYPES SO4/BSO4

	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.) (2)	Pull-thru (lbs.) (2)
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) (2)	Pull-thru (N) (2)
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) 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.