



SB

Flush Head Self-Clinching Studs

FEATURES

- Provide permanent male threads in sheets as thin as .040" (1.00mm).
- Ribbed self-clinching design mounts flush on the back of the sheet while transferring excellent push-out and torque-out resistance.
- Available in a wide variety of materials, finishes and sizes.
- Options include: thread locking, anti-cross threading, self-lubricated threads, and dog point

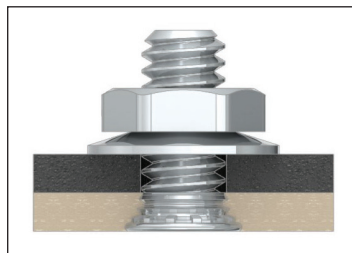
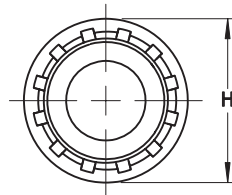
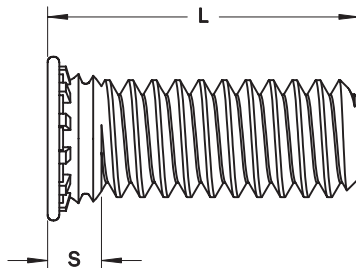


*Now Available in
A286 Stainless Steel
and with a Variety
of Options*

PART DESCRIPTION EXAMPLE

SBST — 632 — 1.250 — Z

Material Code Thread Code Length Finish Code



Flush-head studs join mating panels with a standard nut and washer. Pencom also carries an assortment of nut and washer assemblies (shown).

Flush Head Self-Clinching Studs

GENERAL – MATERIAL CODES ST, SS & AL

All dimensions in inches

INCH	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±.015	S Max.
			Minimum Thickness	Hole Size +.003 -.000	Minimum Distance Hole Center to Edge			
	2-56	256	.040	.085	.187	.105	.144	.075
	4-40	440	.040	.111	.219	.135	.176	.085
	6-32	632	.040	.137	.250	.160	.206	.090
	8-32	832	.040	.163	.281	.185	.237	.090
	10-24	1024	.040	.189	.281	.210	.256	.100
	10-32	1032	.040	.189	.281	.210	.256	.100
	1/4-20	2520	.062	.249	.312	.270	.337	.135
	5/16-18 ¹	3118	.093	.311	.375	.333	.376	.160

All dimensions in millimeters

METRIC	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±0.4	S Max.
			Minimum Thickness	Hole Size +0.08 -0.00	Minimum Distance Hole Center to Edge			
	M2.5 x 0.45	M2.5	1.0	2.50	5.4	3.1	4.1	1.95
	M3 x 0.5	M3	1.0	3.00	5.6	3.6	4.6	2.10
	M3.5 x 0.6	M3.5	1.0	3.50	6.4	4.1	5.3	2.25
	M4 x 0.7	M4	1.0	4.00	7.2	4.6	5.9	2.40
	M5 x 0.8	M5	1.0	5.00	7.2	5.6	6.5	2.70
	M6 x 1.0	M6	1.6	6.00	7.9	6.6	8.2	3.00
	M8 x 1.25 ¹	M8	2.4	8.00	9.6	8.6	9.6	3.70

(1) Thread size not available for AL material code.

GENERAL – MATERIAL CODES S4 & SP

All dimensions in inches

INCH	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±.015	S Max.
			Thickness	Hole Size +.003 -.000	Minimum Distance Hole Center to Edge			
	4-40	440	.040 - .095	.111	.219	.135	.176	.085
	6-32	632	.040 - .095	.137	.250	.160	.206	.090
	8-32	832	.040 - .095	.163	.281	.185	.237	.090
	10-32	1032	.040 - .095	.189	.281	.210	.256	.100
	1/4-20 ¹	2520	.062 - .117	.249	.312	.270	.337	.135

(1) Thread size not available for SP material code.

GENERAL – MATERIAL CODES S4 & SP (CONTINUED)

METRIC	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±0.4	S Max.
			Thickness	Hole Size +0.08 -0.00	Minimum Distance Hole Center to Edge			
	M3 x 0.5	M3	1.0 - 2.4	3.00	5.6	3.6	4.6	2.1
	M4 x 0.7	M4	1.0 - 2.4	4.00	7.2	4.6	5.9	2.4
	M5 x 0.8	M5	1.0 - 2.4	5.00	7.2	5.6	6.5	2.7
	M6 x 1.0 ¹	M6	1.6 - 3.0	6.00	7.9	6.6	8.2	3.0

(1) Thread size not available for SP material code

All dimensions in millimeters

LENGTH – MATERIAL CODES ST, SS & AL

All dimensions in inches

INCH	Thread Code	L (Length) ±.015									
		256	.250	.312	.375	.500	.625	.750	—	—	—
440	.250	.312	.375	.500	.625	.750	.875	1.000	1.250	—	
632	.250	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
832	.250	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
1024	—	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
1032	—	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
2520	—	—	.375	.500	.625	.750	.875	1.000	1.250	1.500	
3118	—	—	—	.500	.625	.750	.875	1.000	1.250	1.500	

All dimensions in millimeters

METRIC	Thread Code	L (Length) ±0.4									
		M2.5	6	8	10	12	15	18	—	—	—
M3	6	8	10	12	15	18	20	25	—	—	
M3.5	6	8	10	12	15	18	20	25	30	—	
M4	6	8	10	12	15	18	20	25	30	35	
M5	—	8	10	12	15	18	20	25	30	35	
M6	—	—	10	12	15	18	20	25	30	35	
M8	—	—	—	12	15	18	20	25	30	35	

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LENGTH – MATERIAL CODES S4 & SP

All dimensions in inches

INCH	Thread Code	L (Length) ±.015									
	440	.250	.312	.375	.500	.625	.750	.875	1.000	—	—
632	.250	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
832	.250	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
1032	—	.312	.375	.500	.625	.750	.875	1.000	1.250	1.500	
2520 ¹	—	—	.375	.500	.625	.750	.875	1.000	1.250	1.500	

All dimensions in millimeters

METRIC	Thread Code	L (Length) ±0.4									
	M3	6	8	10	12	15	18	20	25	—	—
M4	6	8	10	12	15	18	20	25	30	35	
M5	—	8	10	12	15	18	20	25	30	35	
M6 ¹	—	—	10	12	15	18	20	25	30	35	

(1) Thread size not available for SP material code

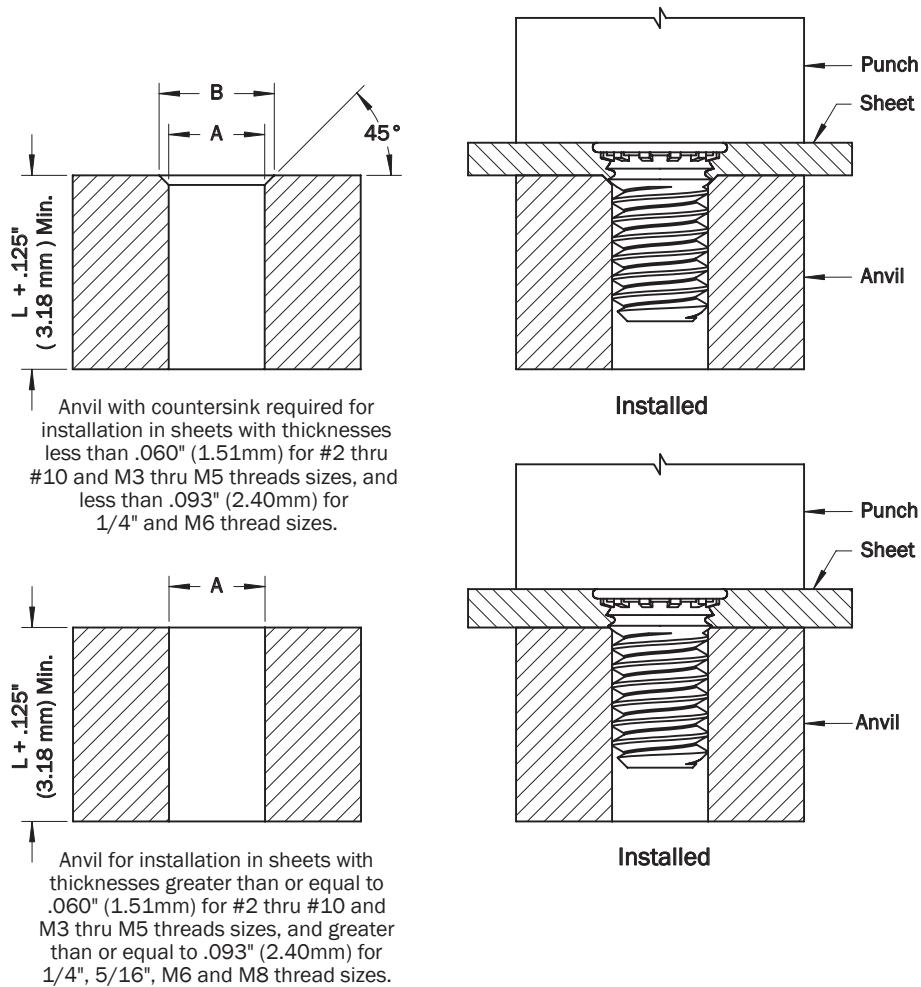
MATERIAL & FINISH

Material Code	Material Description	Finish Code	Finish Description	For Use in Sheet Hardness			
				HRB 50 Max.	HRB 70 Max.	HRB 80 Max.	HRB 92 Max.
ST	Carbon Steel	Z	Zinc (SC1) with Type III Clear Chromate per ASTM B 633			•	
SS	300-Series Stainless Steel	P	Passivated and/or tested per ASTM A 967		•		
AL	Aluminum	PLN	Plain	•			
S4	400-Series Heat-treated Stainless Steel	P	Passivated and/or tested per ASTM A 967				•
SP	A286 Age-hardened Stainless Steel	P	Passivated and/or tested per ASTM A 967				•

Flush Head Self-Clinching Studs

INSTALLATION – MATERIAL CODES ST, SS & AL

1. Punch or drill hole in sheet. Do not deburr edges.
2. Insert stud through hole in sheet and into the anvil as shown below.
3. Squeeze the sheet and stud head between parallel punch and anvil surfaces. Use only enough pressure to seat the stud head flush with the sheet.
4. Anvil with countersink is required for installation in sheets with thicknesses less than .060" (1.51mm) for #2 thru #10 and M3 thru M5 thread sizes, and less than .093" (2.40mm) for 1/4" and M6 thread sizes. Punch and anvil should be made from hardened tool steel.



Flush Head Self-Clinching Studs

ANVIL DIMENSIONS – MATERIAL CODES ST, SS & AL

INCH	Thread Code	A	B
	256	.090/.087	.114/.110
	440	.116/.113	.140/.136
	632	.142/.139	.166/.162
	832	.168/.165	.192/.188
	1024, 1032	.194/.191	.220/.216
	2520	.253/.250	.300/.295
	3118	.3155/.3125	.338/.334

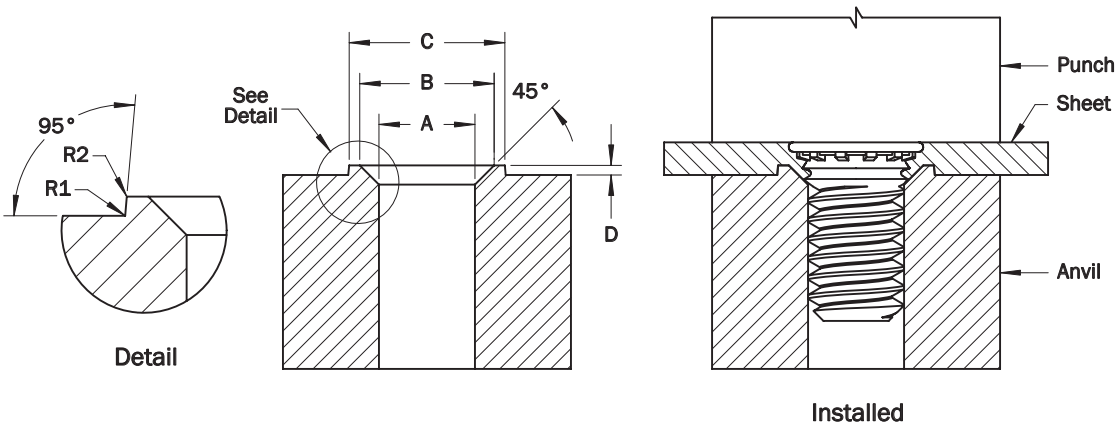
All dimensions in inches

METRIC	Thread Code	A	B
	M2.5	2.61/2.53	3.2/3.1
	M3	3.11/3.03	3.7/3.6
	M3.5	3.61/3.56	4.2/4.1
	M4	4.11/4.03	4.7/4.6
	M5	5.11/5.03	5.7/5.6
	M6	6.03/6.11	6.7/6.6
	M8	8.11/8.03	8.7/8.6

All dimensions in millimeters

INSTALLATION – MATERIAL CODES S4 & SP

1. Punch or drill hole in sheet. Do not deburr edges.
2. Insert stud through hole in sheet and into the anvil as shown below.
3. Squeeze the sheet and stud head between parallel punch and anvil surfaces. Use only enough pressure to seat the stud head flush with the sheet.
4. An anvil with raised ring is required to properly displace the stainless steel sheet material and create the self-clinching union. Punch and anvil should be made from hardened tool steel with anvil having a minimum hardness of HRC 55. The anvil “D” dimension should be measured after every 5,000 installations to ensure conformity with specifications.



Flush Head Self-Clinching Studs

ANVIL DIMENSIONS – MATERIAL CODES S4 & SP

All dimensions in inches

INCH	Thread Code	A +.003 -.000	B ±.002	C ±.002	D ±.001	R1 Max.	R2 Max.
	440	.113	.144	.174	.010	.003	.005
	632	.140	.170	.200	.010	.003	.005
	832	.166	.202	.236	.010	.003	.005
	1032	.191	.235	.275	.010	.003	.005
	2520	.252	.324	.360	.020	.003	.005

All dimensions in millimeters

METRIC	Thread Code	A +0.08 -0.00	B ±0.05	C ±0.05	D ±0.025	R1 Max.	R2 Max.
	M3	3.05	3.81	4.57	0.25	0.08	0.13
	M4	4.04	4.95	5.82	0.25	0.08	0.13
	M5	5.08	6.15	7.16	0.25	0.08	0.13
	M6	6.05	7.87	8.79	0.51	0.08	0.13



Pencom supplies a wide variety of self-clinching and press-in studs for installation in thin metallic and non-metallic sheets. Visit www.pencomsf.com for more information.

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PERFORMANCE – MATERIAL CODES ST & SS

INCH	Thread Code	Stud Material Code	Max. Nut Tightening Torque (in-lbs) ²	Test Sheet			Installation (lbs)	Push-out (lbs)	Torque-out (in-lbs)	Pull-thru (lbs)
				Material	Thickness (in)	Hardness (HRB)				
INCH	256	ST	2.3	Aluminum	.062	29	2000	100	5.0	425
				Carbon Steel	.060	59	2500	180	5.0	425
		SS	2.3	Aluminum	.062	29	2000	100	4.5	300
				Carbon Steel	.060	59	2500	180	4.5	300
	440	ST	5.0	Aluminum	.064	29	3800	170	10	650
				Carbon Steel	.060	59	4300	275	10	650
		SS	5.0	Aluminum	.064	29	3200	170	8.0	500
				Carbon Steel	.060	59	4700	275	8.0	500
	632	ST	9.0	Aluminum	.064	29	3800	180	17	850
				Carbon Steel	.060	59	4700	300	20	850
		SS	9.0	Aluminum	.064	29	3500	180	16	775
				Carbon Steel	.060	59	5000	300	16	775
	832	ST	17	Aluminum	.064	29	4800	220	28	1000
				Carbon Steel	.060	59	6800	375	40	1270
		SS	17	Aluminum	.064	29	4500	220	28	940
				Carbon Steel	.060	59	5500	375	28	1130
1024	ST	24	Aluminum	.064	29	5500	270	30	1220	
			Carbon Steel	.060	59	7500	450	60	1410	
	SS	24	Aluminum	.064	29	5500	270	30	1220	
			Carbon Steel	.060	59	6800	450	50	1410	
1032	ST	27	Aluminum	.064	29	5500	270	30	1220	
			Carbon Steel	.060	59	7500	450	60	1410	
	SS	27	Aluminum	.064	29	5500	270	30	1220	
			Carbon Steel	.060	59	6800	450	50	1410	
2520	ST	58	Aluminum	.093	28	6500	310	65	2300	
			Carbon Steel	.088	46	9500	575	100	2550	
	SS	58	Aluminum	.093	28	6500	310	65	2100	
			Carbon Steel	.088	46	10000	575	100	2550	
3118	ST	120	Aluminum	.093	28	6500	430	100	2260	
			Carbon Steel	.093	46	10000	650	175	3475	
	SS	120	Aluminum	.093	28	6700	430	100	2260	
			Carbon Steel	.093	46	11200	650	175	3120	

Flush Head Self-Clinching Studs

(1) Performance data represents the average destructive result when all installation specifications are strictly followed. Variations in panel hole size, thickness, material and installation method will affect the loads. Pencom strongly encourages testing in the application.
 (2) Maximum recommended tightening torques for studs with material code AL are 60 percent of these values.

PERFORMANCE – MATERIAL CODES ST & SS (CONTINUED)

METRIC	Thread Code	Stud Material Code	Max. Nut Tightening Torque (N-m) ²	Test Sheet			Installation (kN)	Push-out (N)	Torque-out (N-m)	Pull-thru (N)
				Material	Thickness (mm)	Hardness (HRB)				
METRIC	M2.5	ST	0.41	Aluminum	1.6	29	8.9	465	1.0	2600
				Carbon Steel	1.5	59	11.1	740	1.0	2800
		SS	0.41	Aluminum	1.6	29	11.6	465	0.8	1820
				Carbon Steel	1.5	59	13.8	740	0.8	1820
	M3	ST	0.74	Aluminum	1.6	29	12.9	600	1.7	3150
				Carbon Steel	1.5	59	14.7	820	1.7	3840
		SS	0.74	Aluminum	1.6	29	12.9	600	1.3	2570
				Carbon Steel	1.5	59	14.7	820	1.3	2440
	M3.5	ST	1.15	Aluminum	1.6	29	15.6	800	1.7	3780
				Carbon Steel	1.5	59	22.3	1335	2.8	3780
		SS	1.15	Aluminum	1.6	29	15.6	800	1.7	3445
				Carbon Steel	1.5	59	22.3	1335	2.0	3445
	M4	ST	1.70	Aluminum	1.6	29	20.0	975	2.9	4448
				Carbon Steel	1.5	59	28.9	1780	4.2	5650
		SS	1.70	Aluminum	1.6	29	22.3	975	2.9	4180
				Carbon Steel	1.5	59	26.7	1780	2.9	4775
M5	ST	3.50	Aluminum	1.6	29	24.5	1070	3.5	5170	
			Carbon Steel	1.5	59	33.4	2000	6.5	6270	
	SS	3.50	Aluminum	1.6	29	24.5	1070	3.5	4760	
			Carbon Steel	1.5	59	32.5	2000	6.3	6000	
M6	ST	5.90	Aluminum	2.4	28	28.9	1660	7.3	10200	
			Carbon Steel	2.2	46	44.5	2560	11.3	11300	
	SS	5.90	Aluminum	2.4	28	28.9	1660	7.3	9090	
			Carbon Steel	2.2	46	44.5	2560	10.1	10600	
M8	ST	14.2	Aluminum	2.4	28	29.8	1910	11.3	10500	
			Carbon Steel	2.4	46	44.5	2890	19.2	15450	
	SS	14.2	Aluminum	2.4	28	29.8	1910	11.3	9540	
			Carbon Steel	2.4	46	49.8	2890	17.5	13630	

Flush Head Self-Clinching Studs

(1) Performance data represents the average destructive result when all installation specifications are strictly followed. Variations in panel hole size, thickness, material and installation method will affect the loads. Pencom strongly encourages testing in the application.
 (2) Maximum recommended tightening torques for studs with material code AL are 60 percent of these values.

PERFORMANCE – MATERIAL CODES S4 & SP

INCH	Thread Code	Stud Material Code	Max. Nut Tightening Torque (in-lbs)	Test Sheet			Installation (lbs)s	Push-out (lbs)	Torque-out (in-lbs)	Pull-thru (lbs)
				Material	Thickness (in)	Max. Hardness (HRB)				
440	S4		6.0	Stainless Steel	.060	92	9000	450	16.0	800
	SP		6.0	Stainless Steel	.045	92	9000	520	10.6	605
632	S4		11	Stainless Steel	.060	92	9500	540	27.0	1350
	SP		11	Stainless Steel	.045	92	9500	670	19.5	940
832	S4		21	Stainless Steel	.060	92	11200	780	58.0	1800
	SP		21	Stainless Steel	.045	92	11200	785	37.5	1415
1032	S4		33	Stainless Steel	.060	92	12000	1050	95.0	2250
	SP		33	Stainless Steel	.045	92	12000	920	59.5	1500
2520	S4		70	Stainless Steel	.060	92	23000	1600	156	3900

METRIC	Thread Code	Stud Material Code	Max. Nut Tightening Torque (in-lbs)	Test Sheet			Installation (kN)	Push-out (N)	Torque-out (N-m)	Pull-thru (N)
				Material	Thickness (mm)	Max. Hardness (HRB)				
M3		S4	0.9	Stainless Steel	1.50	92	40	2220	1.80	3500
M4	S4		2.1	Stainless Steel	1.50	92	50	3210	6.50	8000
	SP		2.1	Stainless Steel	1.14	92	50	3000	3.90	6000
M5	S4		4.3	Stainless Steel	1.50	92	53	3575	10.7	10000
	SP		4.3	Stainless Steel	1.14	92	53	3890	7.35	7320
M6		S4	7.2	Stainless Steel	1.50	92	71	4200	15.9	14900

(1) Performance data represents the average destructive result when all installation specifications are strictly followed. Variations in panel hole size, thickness, material and installation method will affect the loads. Pencom strongly encourages testing in the application.

Flush Head Self-Clinching Studs

OPTIONS

Thread Locking Element

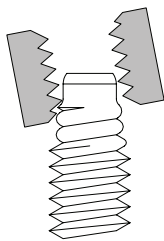
A nylon thread locking element can be applied to the stud threads to prevent loosening due to vibration. To specify, insert **PATCH** at the end of the part description. Other locking elements such as micro-encapsulated epoxy available by request.

Ex. SBST-632-1.250-PATCH

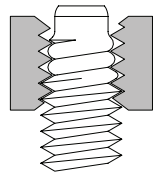


Anti-Cross Thread Feature

Pencom can provide most studs with the MATHread® Anti-Cross Thread Technology. This patented unique thread design significantly reduces or eliminates thread assembly damage while improving assembly times. Contact your Pencom Account Representative for ordering information.



When the misaligned threads contact, the MATHread® ball bearing-shaped lead threads reduce friction with internal threads and prevent jamming.



The threads actively force themselves into alignment with little resistance improving assembly times and reducing operator fatigue.

MATHread is a registered trademark of MATHread, Inc.

Thread Lubricating and Masking

Studs can be supplied with a variety of thread lubricating and masking materials. Available coatings reduce friction, heat buildup and galling during installation and prevent paint, weld spatter and electro-deposited undercoatings from adhering to stud threads. Contact a Pencom Account Representative to discuss your application.

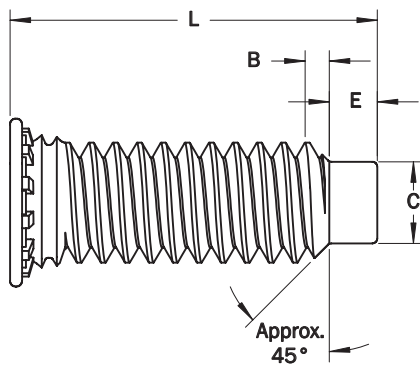


OPTIONS (CONTINUED)

DOG POINT

A dog point lead-in improves location of the mating fastener and protects the beginning threads during engagement. To specify, insert **DOG** at the end of the part description.

Ex. SBST-632-1.250-**DOG**



All dimensions in inches

INCH	Thread Code	C ±.005 ²	E ±.010	B Nom. Transitional Length to Full Thread
	632	.086	.050	.098
	832	.111	.055	.099
	1024	.124	.065	.127
	1032	.138	.065	.098
	2520	.173	.085	.149
	3118	.228	.105	.164

All dimensions in millimeters

METRIC	Thread Code	C ±0.13 ²	E ±0.25	B Nom. Transitional Length to Full Thread
	M3.5	2.40	1.27	1.88
	M4	2.79	1.40	2.26
	M5	3.66	1.78	2.48
	M6	4.37	2.03	3.05
	M8	6.05	2.67	3.73

- (1) For "L" refer to stud length tables.
- (2) Maximum dog point diameter is .003" less than minimum minor diameter of 2B nut threads.

- (1) For "L" refer to stud length tables.
- (2) Maximum dog point diameter is 0.08 mm less than minimum minor diameter of 6H nut threads.