



SB

Flush Head Self-Clinching Studs

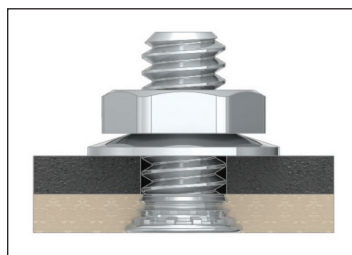
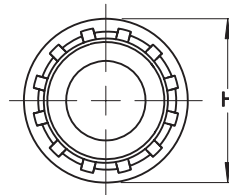
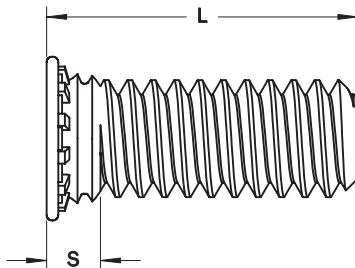
FEATURES

- 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.



PART DESCRIPTION EXAMPLE

SBST — 632 — 1.250 — Z
 T T T T
 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).

SB 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. (2)
			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. (2)
			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.

(2) Threads are gaugeable to within two pitches of the "S max." dimension. A class 3B/5H maximum material commercial nut shall pass up to the "S Max." dimension.

GENERAL – MATERIAL CODE S4

All dimensions in inches

INCH	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±.015	S Max. (2)
			Thickness (1)	Hole Size +.003 - .000	Minimum Distance Hole Center to Edge			
	4-40	440	.040 - .095	.111	.219	.131	.176	.085
	6-32	632	.040 - .095	.137	.250	.157	.206	.090
	8-32	832	.040 - .095	.163	.281	.183	.237	.090
	10-32	1032	.040 - .095	.189	.281	.209	.256	.100
	1/4-20	2520	.062 - .117	.249	.312	.269	.337	.135

(1) Performance may be reduced for studs installed into thicker sheets.

(2) Threads are gaugeable to within two pitches of the "S max." dimension. A class 3B/5H maximum material commercial nut shall pass up to the "S Max." dimension.

GENERAL – MATERIAL CODE S4 (CONTINUED) All dimensions in millimeters

METRIC	Thread	Thread Code	Sheet			Maximum Hole Size in Attached Parts	H ±0.4	S Max. (2)
			Thickness (1)	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	3.3	4.6	2.1
	M4 x 0.7	M4	1.0 - 2.4	4.00	7.2	4.7	5.9	2.4
	M5 x 0.8	M5	1.0 - 2.4	5.00	7.2	5.3	6.5	2.7
	M6 x 1.0	M6	1.6 - 3.0	6.00	7.9	6.8	8.2	3.0

- (1) Performance may be reduced for studs installed into thicker sheets.
- (2) Threads are gaugeable to within two pitches of the "S max." dimension. A class 3B/5H maximum material commercial nut shall pass up to the "S Max." dimension.

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	

SB Flush Head Self-Clinching Studs

LENGTH – MATERIAL CODE S4

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	—	—	.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	—	—	10	12	15	18	20	25	30	35	

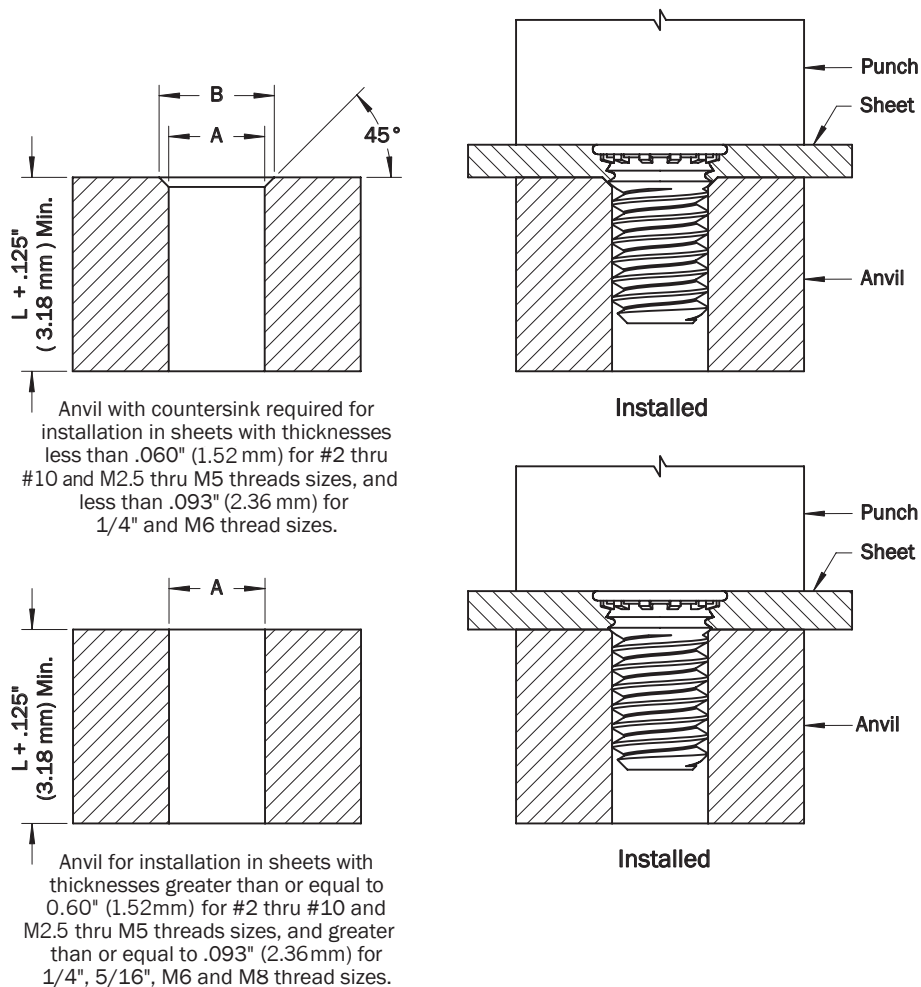
MATERIAL & FINISH

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	Heat Treated 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				•

SB Flush Head Self-Clinching Studs

INSTALLATION – MATERIAL CODES ST, SS & AL

1. Prepare correct sized mounting hole in sheet. Do not deburr edges.
2. Insert stud through punch side of hole in sheet and into the anvil as shown below.
3. Squeeze the sheet and stud head between parallel anvil and punch 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" (1.52mm) for #2 thru #10 and M2.5 thru M5 thread sizes, and less than .093" (2.36mm) for 1/4" and M6 thread sizes. Anvils and punches may be ordered using the part numbers shown in the tables on page 6, or made from hardened tool steel.



SB Flush Head Self-Clinching Studs

ANVIL DIMENSIONS – MATERIAL CODES ST, SS & AL

INCH	Thread Code	A	B	Anvil Part Number		Punch Part Number
				For Sheets < .060"	For Sheets ≥ .060"	
				256	.090/.087	
440	.116/.113	.140/.136	TL1707	TL1721	TL1695	
632	.142/.139	.166/.162	TL1708	TL1722	TL1695	
832	.168/.165	.192/.188	TL1709	TL1723	TL1695	
1024, 1032	.194/.191	.220/.216	TL1710	TL1724	TL1695	
			For Sheets < .093"	For Sheets ≥ .093"		
2520	.253/.250	.300/.295	TL1711	TL1725	TL1695	
3118	.3155/.3125	.338/.334	--	TL1726	TL1695	

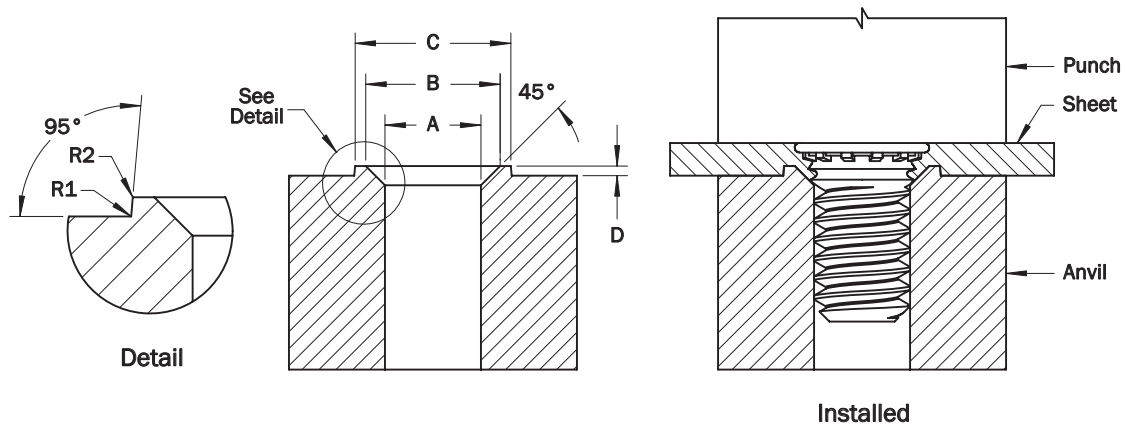
All dimensions in inches

METRIC	Thread Code	A	B	Anvil Part Number		Punch Part Number
				For Sheets < 1.52mm	For Sheets ≥ 1.52mm	
				M2.5	2.61/2.53	
M3	3.11/3.03	3.7/3.6	TL1714	TL1728	TL1695	
M3.5	3.61/3.53	4.2/4.1	TL1715	TL1729	TL1695	
M4	4.11/4.03	4.7/4.6	TL1716	TL1730	TL1695	
M5	5.11/5.03	5.7/5.6	TL1717	TL1731	TL1695	
			For Sheets < 2.36mm	For Sheets ≥ 2.36mm		
M6	6.11/6.03	6.7/6.6	TL1718	TL1732	TL1695	
M8	8.11/8.03	8.7/8.6	--	TL1733	TL1695	

All dimensions in millimeters

INSTALLATION – MATERIAL CODE S4

1. Prepare correct sized mounting hole in sheet. Do not deburr edges.
2. Insert stud through punch side of hole in sheet and into the anvil as shown below.
3. Squeeze the sheet and stud head between parallel anvil and punch 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. Anvils and punches may be ordered using the part numbers shown in the tables on page 7, or 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.



ANVIL DIMENSIONS – MATERIAL CODE S4

All dimensions in inches

INCH	Thread Code	A +.003 -.000	B ±.002	C ±.002	D ±.001	R1 Max.	R2 Max.	Anvil Part Number	Punch Part Number
	440	.113	.144	.174	.010	.003	.005	TL1734	TL1695
	632	.140	.170	.200	.010	.003	.005	TL1735	TL1695
	832	.166	.202	.236	.010	.003	.005	TL1736	TL1695
	1032	.191	.235	.275	.010	.003	.005	TL1737	TL1695
	2520	.252	.324	.360	.020	.003	.005	TL1738	TL1695

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.	Anvil Part Number	Punch Part Number
	M3	3.05	3.81	4.57	0.25	0.08	0.13	TL1739	TL1695
	M4	4.04	4.95	5.82	0.25	0.08	0.13	TL1740	TL1695
	M5	5.08	6.15	7.16	0.25	0.08	0.13	TL1741	TL1695
	M6	6.05	7.87	8.79	0.51	0.08	0.13	TL1742	TL1695



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.

SB Flush Head Self-Clinching Studs

PERFORMANCE – MATERIAL CODES ST & SS

All dimensions in inches

INCH	Thread Code	Stud Material Code	Max. Nut Tightening Torque (in-lbs)	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	

SB Flush Head Self-Cinching 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.

PERFORMANCE – MATERIAL CODES ST & SS (CONTINUED)

All dimensions in millimeters

METRIC	Thread Code	Stud Material Code	Max. Nut Tightening Torque (N-m)	Test Sheet			Installation (kN)	Push-out (N)	Torque-out (N-m)	Pull-thru (N)
				Material	Thickness (mm)	Hardness (HRB)				
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	

(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.

SB Flush Head Self-Cinching Studs

PERFORMANCE – MATERIAL CODE AL

All dimensions in inches

INCH	Thread Code	Max. Nut Tightening Torque (in-lbs)	Test Sheet			Installation (lbs)	Push-out (lbs)	Torque-out (in-lbs)	Pull-thru (lbs)
			Material	Thickness (in)	Hardness (HR15T)				
	440	3.0	5052-H34 Aluminum	.061	75.1	2500	155	4.0	270
	632	5.4	5052-H34 Aluminum	.061	75.1	2600	180	8.0	380
	832	10.2	5052-H34 Aluminum	.061	73	3200	190	15	500
	1032	16.2	5052-H34 Aluminum	.061	75	3200	220	28	600
	2520	34.8	5052-H34 Aluminum	.061	75	5500	300	55	1050

All dimensions in millimeters

METRIC	Thread Code	Max. Nut Tightening Torque (N-m)	Test Sheet			Installation (kN)	Push-out (N)	Torque-out (N-m)	Pull-thru (N)
			Material	Thickness (mm)	Hardness (HR15T)				
	M3	0.44	5052-H34 Aluminum	1.55	74	10.7	575	0.5	1500
	M4	1.02	5052-H34 Aluminum	1.55	75	14.3	775	1.35	2000
	M5	2.10	5052-H34 Aluminum	1.55	75	15.2	900	2.6	2500
	M6	3.54	5052-H34 Aluminum	1.55	75.1	24.5	1500	5.3	4500

(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.

PERFORMANCE – MATERIAL CODE S4

All dimensions in inches

INCH	Thread Code	Max. Nut Tightening Torque (in-lbs)	Test Sheet			Installation (lbs)	Push-out (lbs)	Torque-out (in-lbs)	Pull-thru (lbs)
			Material	Thickness (in) (2)	Hardness (HRB)				
	440	6.0	Stainless Steel	.060	87	9000	450	16	800
	632	11	Stainless Steel	.060	87	9500	540	27	1350
	832	21	Stainless Steel	.060	86	11200	780	58	1800
	1032	33	Stainless Steel	.060	86	12000	800	95	2250
	2520	70	Stainless Steel	.060	88	23000	1600	156	3900

All dimensions in millimeters

METRIC	Thread Code	Max. Nut Tightening Torque (N-m)	Test Sheet			Installation (kN)	Push-out (N)	Torque-out (N-m)	Pull-thru (N)
			Material	Thickness (mm) (2)	Hardness (HRB)				
	M3	0.9	Stainless Steel	1.50	87	40	2220	1.80	3500
	M4	2.1	Stainless Steel	1.50	86	50	3210	6.50	8000
	M5	4.3	Stainless Steel	1.50	86	53	3560	10.7	10000
	M6	7.2	Stainless Steel	1.50	88	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.
- (2) Performance may be reduced if installed into thicker sheets.

SB Flush Head Self-Clinching Studs

OPTIONS

Thread Locking Element

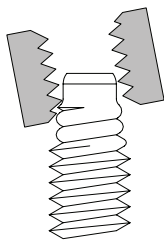
A nylon thread locking element can be applied to the stud threads to prevent loosening due to vibration. To specify, insert **PATCH** at the end of the part description. Other locking elements such as micro-encapsulated epoxy are available by request.

Ex. SBST-632-1.250-Z-**PATCH**

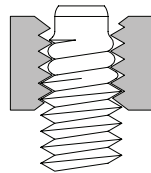


Anti-Cross Thread Feature

PENCOM can provide most studs with the MATHread® Anti-Cross Thread Technology. This 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.

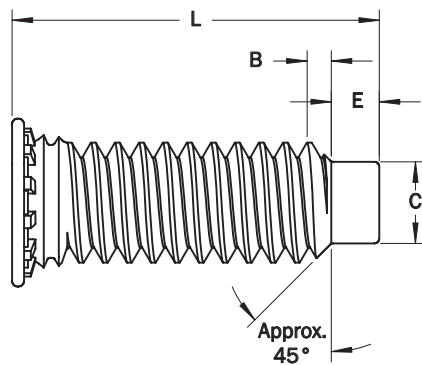


OPTIONS (CONTINUED)

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-Z-**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

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

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 0.08 mm less than minimum minor diameter of 6H nut threads.