



Motorcyclemetal.com Inc.

5490 S.W. 42nd St.
Davie, FL 33314
1-866-899-5962 Toll free
1-954-449-6173 Local

FREE REFERENCE

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Mechanical Requirements for Stainless Steel & Non-Ferrous Fasteners

Grade(1)	General Description of Material	Bolts, Screws and Studs					Nuts		
		Full Size Bolts, Screws, Studs		Machine Test Specimens of Bolts, Screws, Studs			Hardness Rockwell	Proof Load Stress	Hardness Rockwell
		Yield (2) Strength	Tensile Strength	Yield (2) Strength	Tensile Strength	Elongation(3)			
		Min psi	Min psi	Min psi	Min psi	% Min.	Min	psi	Min
303A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B75	75,000	B75
304-A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B75	75,000	B75
304	Austenitic Stainless Steel- Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
304-SH	Austenitic Stainless Steel- Strain Hardened	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20
305-A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
305	Austenitic Stainless Steel- Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
305-SH	Austenitic Stainless Steel- Strain Hardened	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20
316-A	Austenitic Stainless Steel- Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
316	Austenitic Stainless Steel- Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
316-SH	Austenitic	See	See	See	See	15	C25	See	C20










	Stainless Steel-Strain Hardened	Note 6	Note 6	Note 6	Note 6			Note 6	
XM7-A	Austenitic Stainless Steel-Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
XM7	Austenitic Stainless Steel-Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
384-A	Austenitic Stainless Steel-Sol. Annealed	30,000	75,000	30,000	75,000	20	B70	75,000	B70
384	Austenitic Stainless Steel-Cold Worked	50,000	90,000	45,000	85,000	20	B85	90,000	B85
410-H	Martensitic Stainless Steel-Hardened and Tempered	95,000	125,000	95,000	125,000	20	C22	125,000	C22
410-HT	Martensitic Stainless Steel-Hardened and Tempered	135,000	180,000	135,000	180,000	12	C36	180,000	C36
416-H	Martensitic Stainless Steel-Hardened and Tempered	95,000	125,000	95,000	125,000	20	C22	125,000	C22
416-HT	Martensitic Stainless Steel-Hardened and Tempered	135,000	180,000	135,000	180,000	12	C36	180,000	C36
430	Ferritic Stainless Steel	40,000	70,000	40,000	70,000	20	B75	70,000	B75
464-HF	Naval Brass	15,000	52,000	14,000	50,000	25	B56	52,000	B56
464	Naval Brass	27,000	60,000	25,000	57,000	25	B65	60,000	B65
462	Naval Brass	27,000	52,000	24,000	50,000	20	B65	52,000	B65
642	Aluminum Bronze	35,000	72,000	35,000	72,000	15	B75	72,000	B75
630	Aluminum Bronze	50,000	105,000	50,000	105,000	10	B90	105,000	B90













614	Aluminum Bronze	40,000	75,000	40,000	75,000	30	B70	75,000	B70
510	Phosphor Bronze	35,000	60,000	35,000	60,000	15	B60	60,000	B60
675	Manganese Bronze	22,000	55,000	22,000	55,000	20	B60	55,000	B60
655-HF	Silicon Bronze	20,000	52,000	18,500	50,000	20	B60	52,000	B60
655	Silicon Bronze	38,000	70,000	36,000	68,000	15	B75	70,000	B75
651	Silicon Bronze	45,000	75,000	42,500	72,000	8	B75	75,000	B75
661	Silicon Bronze	38,000	70,000	38,000	70,000	15	B75	70,000	B75
NICU-A-HF	Nickel-Copper Alloy A	25,000	70,000	25,000	70,000	20	B70	70,000	B70
NICU-A	Nickel-Copper Alloy A	40,000	80,000	40,000	80,000	20	B80	80,000	B80
NICU-B	Nickel-Copper Alloy B	40,000	80,000	40,000	80,000	20	B80	80,000	B80
NICU-K(7)	Nickel-Copper Aluminum Alloy	90,000	130,000	90,000	130,000	20	C24	130,000	C24
2024-T4	Aluminum Alloy	40,000	55,000	40,000	55,000	14	B70	55,000	B70
6061-T6	Aluminum Alloy	35,000	42,000	35,000	42,000	12	B50	42,000	B50













Note 6. Austenitic stainless steel, strain hardened bolts, screws, studs, and nuts shall have the following strength per properties.











Product Size	Bolts, Screws, Studs				Nuts
	Tested Full Size		Machine Test Specimens,		Proof Load Stress
	Yield Strength	Tensile Strength	Yield Strength	Tensile Strength	
in.	min psi	min psi	min psi	min psi	psi
to 5/8 in.	100,000	125,000	90,000	115,000	125,000
over 5/8 to 1 in.	70,000	105,000	65,000	100,000	105,000
over 1 to 1-1/2 in.	50,000	90,000	45,000	85,000	90,000





ASTM, SAE AND ISO GRADE MARKINGS AND MECHANICAL PROPERTIES FOR STEEL FASTENERS

Identification Grade Mark	Specification	Fastener Description	Material	Nominal Size Range (in.)	Mechanical Properties		
					Proof Load (psi)	Yield Strength Min (psi)	Tensile Strength Min (psi)
 No Grade Mark	SAE J429 Grade 1	Bolts, Screws, Studs	Low or Medium Carbon Steel	1/4 thru 1-1/2	33,000	36,000	60,000
	ASTM A307 Grades A&B		Low Carbon Steel	1/4 thru 4	--	--	
	SAE J429 Grade 2		Low or Medium Carbon Steel	1/4 thru 3/4 Over 3/4 to 1-1/2	55,000 33,000	57,000 36,000	74,000 60,000
 No Grade Mark	SAE J429 Grade 4	Studs	Medium Carbon Cold Drawn Steel	1/4 thru 1-1/2	--	100,000	115,000
 B5	ASTM A193 Grade B5		AISI 501	1/4 Thru 4	--	80,000	100,000
 B6	ASTM A193 Grade B6		AISI 410			85,000	110,000
 B7	ASTM A193 Grade B7		AISI 4140, 4142, OR 4105	1/4 thru 2-1/2 Over 2-1/2 thru 4 Over 4 thru 7	-- -- --	105,000 95,000 75,000	125,000 115,000 100,000
 B16	ASTM A193 Grade B16		CrMoVa Alloy Steel			105,000 95,000 85,000	125,000 115,000 100,000
 B8	ASTM A193 Grade B8		AISI 304	1/4 and larger	--	30,000	75,000
 B8C	ASTM A193 Grade B8C		AISI 347				
 B8M	ASTM A193 Grade B8M		AISI 316				

B8M							
 B8T	ASTM A193 Grade B8T	Bolts, Screws, Studs for High- Temperature Service	AISI 321	1/4 and larger	--	30,000	75,000
 B8	ASTM A193 Grade B8		AISI 304 Strain Hardened	1/4 thr 3/4 Over 3/4 thru 1 Over 1 thru 1-1/4 Over 1-1/4 thru 1-1/2	-- -- -- --	100,000	125,000
 B8C	ASTM A193 Grade B8C		AISI 347 Strain Hardened			80,000	115,000
 B8M	ASTM A193 Grade B8M		AISI 316 Strain Hardened			65,000	105,000
 B8T	ASTM A193 Grade B8T		AISI 321 Strain Hardened			50,000	100,000
 L7	ASTM A320 Grade L7		AISI 4140, 4142 or 4145			100,000	125,000
 L7A	ASTM A320 Grade L7A	AISI 4037					
 L7B	ASTM A320 Grade L7B	AISI 4137					
 L7C	ASTM A320 Grade LC7	AISI 8740					
 L43	ASTM A320 Grade L43	AISI 4340	1/4 thru 4	--	105,000	125,000	
 B8	ASTM A320 Grade B8	Bolts, Screws, Studs for Low- Temperature Service	AISI 304	1/4 and larger	--	30,000	75,000
 B8C	ASTM A320 Grade B8C		AISI 347				

 B8T	ASTM A320 Grade B8T		AISI 321				
 B8F	ASTM A320 Grade B8F		AISI 303 or 303Se				
 B8M	ASTM A320 Grade B8M		AISI 316				
 B8	ASTM A320 Grade B8		AISI 304				
 B8C	ASTM A320 Grade B8C		AISI 347				
 B8F	ASTM A320 Grade B8F		AISI 303 or 303Se	1/4 thru 3/4 Over 3/4 thru 1 Over 1 thru 1-1/4 Over 1-1/4 thru 1-1/2	-- -- -- --	100,000 80,000 65,00 50,00	100,000 80,000 65,00 50,00
 B8M	ASTM A320 Grade B8M		AISI 316				
 B8T	ASTM A320 Grade B8T		AISI 321				
	SAE J429 Grade 5	Bolts, Screws, Studs	Medium Carbon Steel, Quenched and Tempered	1/4 thru 1 Over 1 to 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
	ASTM A449			1/4 thru 1 Over 1 to 1-1/2 Over 1-1/2 thru 3	85,000 74,000 55,000	92,000 81,000 58,000	120,000 105,000 90,000
	SAE J429 Grade 5.1	Sems	Low or Medium Carbon Steel, Quenched and Tempered	No. 6 thru 3/8	85,000	--	120,000
	SAE J429 Grade 5.2	Bolts, Screws, Studs	Low Carbon Martensitic Steel, Quenched and Tempered	1/4 thru 1	85,000	92,000	120,000
	ASTM A325 Type 1	High Strength Structural	Medium Carbon Steel, Quenched	1/2 thru 1 1-1/8 thru	85,000 74,000	92,000 81,000	120,000 105,000

A325			and Tempered	1-1/2			
 A325	ASTM A325 Type 2	Bolts	Low Carbon Martensitic Steel, Quenched and Tempered	1/2 thru 1	85,000	92,000	120,000
 A325	ASTM A325 Type 3		Atmospheric Corrosion Resisting Steel, Quenched and Tempered	1/2 thru 1 1-1/8 thru 1-1/2	85,000 74,000	92,000 81,000	120,000 105,000
 BB	ASTM A354 Grade BB	Bolts, Studs	Alloy Steel, Quenched and Tempered	1/4 thru 2- 1/2 2-3/4 thru 4	80,000	83,000	105,000
 BC	ASTM A354 Grade BC				75,000	78,000	100,000
	SAE J429 Grade 7	Bolts, Screws,	Medium Carbon Alloy Steel, Quenched and Tempered ⁴	1/4 thru 1- 1/2	105,000	115,000	133,000
	SAE J429 Grade 8	Bolts, Screws, Studs	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 1- 1/2	120,000	130,000	150,000
	ASTM A354 Grade BD		Alloy Steel, Quenched and Tempered ⁴				
 No Grade Mark	SAE J429 Grade 8.1	Studs	Medium Carbon Alloy or SAE 1041 Modified Elevated Temperature Drawn Steel	1/4 thru 1- 1/2	120,000	130,000	150,000
 A490	ASTM A490	High Strength Structural Bolts	Alloy Steel, Quenched and Tempered	1/2 thru 1- 1/2	120,000	130,000	150,000 min 170,000 max
 No Grade Mark	ISO R898 Class 4.6	Bolts, Screws, Studs	Medium Carbon Steel, Quenched and Tempered	All Sizes thru 1-1/2	33,000	36,000	60,000
 No Grade Mark	ISO R898 Class 5.8				55,000	57,000	74,000
8.8	ISO R898 Class 8.8				Alloy Steel, Quenched and	85,000	92,000

 or  88								
10.9  or  109	ISO R898 Class 10.9		Tempered			120,000	130,000	150,000

TAP AND DRILL SIZE CHART

THREAD SIZE	DRILL DIAMETER <i>Coarse Thread</i>	TAP DRILL SIZE
1-64	.0595	No. 53
2-56	.0700	No. 50
3-48	.0785	No. 47
4-40	.0890	No. 43
5-40	.1015	No. 38
6-32	.1065	No. 36
8-32	.1360	No. 29
10-24	.1495	No. 25
12-24	.1770	No. 16
1/4-20	.2010	No. 7
5/16-18	.2570	'F'
3/8-16	.3125	5/16
7/16-14	.3680	'U'
1/2-13	.4219	27/64
9/16-12	.4844	31/64
5/8-11	.5312	17/32
3/4-10	.6562	21/32

7/8-9	.7656	49/64
1"-8	.8750	7/8
<i>Fine Thread</i>		
0-80	.0469	3/64
1-72	.0595	No. 53
2-64	.0700	No. 50
3-56	.0820	No. 45
4-48	.0935	No. 42
5-44	.1040	No. 37
6-40	.1130	No. 33
8-36	.1360	No. 29
10-32	.1590	No. 21
12-28	.1820	No. 14
1/4-28	.2130	No. 3
5/16-24	.2720	'I'
3/8-24	.3320	'Q'
7/16-20	.3906	25/64
1/2-20	.4531	29/64
9/16-18	.5156	33/64
5/8-18	.5781	37/64
3/4-16	.6875	11/16
7/8-14	.8125	13/16
1"-14	.9375	59/64

DECIMAL EQUIVALENT AND TAP DRILL SIZES

FRACTION OR DRILL SIZES	DECIMAL EQUIVALENT	TAP SIZE	FRACTION OR DRILL SIZES	DECIMAL EQUIVALENT	TAP SIZE	FRACTION OR DRILL SIZES	DECIMAL EQUIVALENT	TAP SIZE
80	.0135		27	.1440		3/8	.3750	
79	.0145		26	.1470		V	.3770	
1/64	.0156		25	.1495	10-24	W	.3860	
78	.0160		24	.1520		25/64	.3906	7/16-20
77	.0180		23	.1540		X	.3970	
76	.0200		5/32	.1562		Y	.4040	
75	.0210		22	.1570		13/32	.4060	
74	.0225		21	.1580		Z	.4130	
73	.0240		20	.1610		27/64	.4219	1/2-13

72	.0250		19	.1660		7/16	.4375	
71	.0260		18	.1695		29/64	.4531	1/2-20
70	.0280		11/64	.1719		15/32	.4687	
69	.0292		17	.1730		31/64	.4844	9/16-12
68	.0310		16	.1770	12-24	1/2	.5000	
1/32	.0312		15	.1800		33/64	.5156	9/16-18
67	.0320		14	.1820	12-28	17/32	.5312	5/8-11
66	.0330		13	.1850	12-32	35/64	.5469	
65	.0350		3/16	.1875		9/16	.5625	
64	.0360		12	.1890		37/64	.5781	5/8-18
63	.0370		11	.1910		19/32	.5937	
62	.0380		10	.1935		39/64	.6094	11/16-11
61	.0390		9	.1960		5/8	.6250	11/16-16
60	.0400		8	.1990		41/64	.6406	
59	.0410		7	.2010	1/4-20	21/32	.6562	3/4-10
58	.0420		13/64	.2031		43/64	.6719	
57	.0430		6	.2040		11/16	.6875	3/4-16
56	.0465		5	.2055		45/64	.7031	
3/64	.0469	0-80	4	.2090		23/32	.7187	
55	.0520		3	.2130	1/4-28	47/64	.7344	
54	.0550	1-56	7/32	.2187		3/4	.7500	
53	.0590	1-64, 72	2	.2210		49/64	.7656	7/8-9
1/16	.0625		1	.2280		25/32	.7812	
52	.0635		A	.2340		51/64	.7969	
51	.0670		15/64	.2344		13/16	.8125	7/8-14
50	.0700	2-56, 64	B	.2380		53/64	.8281	
49	.0730		C	.2420		27/32	.8437	
48	.0760		D	.2460		55/64	.8594	
5/64	.0781		1/4 E	.2500		7/8	.8750	1-8
47	.0785	3-48	F	.2570	5/16-18	57/64	.8906	
46	.0810		G	.2610		29/32	.9062	
45	.0820	3-56, 4-32	17/64	.2656		59/64	.9219	1-12
44	.0860	4-38	H	.2660		15/16	.9375	1-14
43	.0890	4-40	I	.2720	5/16-24	61/64	.9531	
42	.0935	4-48	J	.2770		31/32	.9687	
3/32	.0937		K	.2810		63/64	.9844	1 1/8-7
41	.0960		9/32	.2812		1	1.00	
40	.0980		L	.2900				
39	.0995		M	.2950				

PIPE THREAD SIZES

33	.1130	6-40	Q	.3320	3/8-24	2-11-1/2	2-7/32
32	.1160		R	.3390		2-1/2-8	2-5/8
31	.1200		11/32	.3437		3-8	3-1/4
1/8	.1250		S	.3480		3-1/2-8	3-3/4
30	.1285		T	.3580		4-8	4-1/4
29	.1360	8-32, 36	23/64	.3594			
28	.1405	8-40	U	.3680	7/16-14		
9/64	.1406						

Fraction, Decimal, and Metric Equivalents for 0 - 1"

FRACTIONS	DECIMALS	MM	FRACTIONS	DECIMALS	MM	FRACTIONS	DECIMALS	MM
1/64	.015625	.397	21/64	.328125	8.334	41/64	.640625	16.272
1/32	.031250	.794	11/32	.343750	8.731	21/32	.656250	16.669
1/16	.062500	1.191	23/64	.359375	9.128	43/64	.671875	17.066
3/64	.046875	1.588	3/8	.375000	9.525	11/16	.687500	17.463
5/64	.078125	1.984	25/64	.390625	9.922	45/64	.703125	17.859
3/32	.093750	2.381	13/32	.406250	10.319	23/32	.718750	18.256
7/64	.109375	2.778	27/64	.421875	10.716	47/64	.734375	18.653
1/8	.125000	3.175	7/16	.437500	11.113	3/4	.750000	19.050
9/64	.140625	3.572	29/64	.453125	11.509	49/64	.765625	19.447
5/32	.156250	3.969	15/32	.468750	11.906	25/32	.781250	19.844
11/64	.171875	4.366	31/64	.484375	12.303	51/64	.796875	20.241
3/16	.187500	4.763	1/2	.500000	12.700	13/16	.812500	20.638
13/64	.203125	5.159	33/64	.515625	13.097	53/64	.828125	21.034
7/32	.218750	5.556	17/32	.531250	13.494	27/32	.843750	21.431
15/64	.234375	5.953	35/64	.546875	13.891	55/64	.859375	21.828
1/4	.250000	6.350	9/16	.562500	14.288	7/8	.875000	22.225
17/64	.265625	6.747	37/64	.578125	14.684	57/64	.890625	22.622
9/32	.281250	7.144	19/32	.593750	15.081	15/16	.937500	23.813
19/64	.296875	7.541	39/64	.609375	15.475	1	1.00	25.400
5/16	.312500	7.938	5/8	.625000	15.875			

INCHES TO MILLIMETER CONVERSION CHART 0 - 66"

in.	mm.	in.	mm.	in.	mm.	in.	mm.	in.	mm.
0.001	0.0254	1	25.4	28	711.2	41	1041.4	54	1371.6
0.002	0.0508	2	50.8	29	736.6	42	1066.8	55	1397.0
0.003	0.0762	3	76.2	30	762.0	43	1092.2	56	1422.4
0.004	0.1016	4	101.6	31	787.4	44	1117.6	57	1447.8
0.005	0.1270	5	127.0	32	812.8	45	1143.0	58	1473.2
0.006	0.1524	6	152.4	33	838.2	46	1168.4	59	1498.6
0.007	0.1778	7	177.8	34	863.6	47	1193.8	60	1524.0
0.008	0.2032	8	203.2	35	889.0	48	1219.2	61	1549.4
0.009	0.2286	9	228.6	36	914.4	49	1244.6	62	1574.8
0.01	0.254	10	254.0	37	936.8	50	1270.0	63	1600.2
0.02	0.508	11	279.4	38	965.2	51	1295.4	64	1625.6
0.03	0.762	12	304.8	39	990.6	52	1320.8	65	1651.0
0.04	1.016	13	330.2	40	1016.0	53	1346.2	66	1676.4
0.05	1.270	14	355.6						

Fraction Conversion Chart

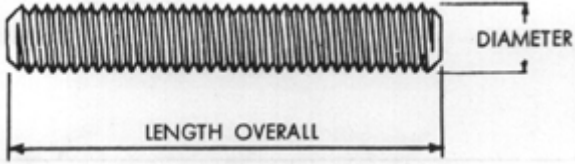
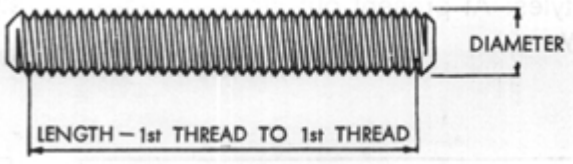
1/64	0.015625	1/2	0.5
1/32	0.03125	33/64	0.515625
3/64	0.046875	17/32	0.53125
1/16	0.0625	35/64	0.546875
5/64	0.078125	9/16	0.5625
3/32	0.09375	37/64	0.578125
7/64	0.109375	19/32	0.59375
1/8	0.125	39/64	0.609375
9/64	0.140625	5/8	0.625
5/32	0.15625	41/64	0.640625
11/64	0.171875	21/32	0.65625
3/16	0.1875	43/64	0.671875
13/64	0.203125	11/16	0.6875
7/32	0.21875	45/64	0.703125
15/64	0.234375	23/32	0.71875
		47/64	0.734375
1/4	0.25		
17/64	0.265625	3/4	0.75
9/32	0.28125	49/64	0.765625
19/64	0.296875	25/32	0.78125
5/16	0.3125	51/64	0.796875
21/64	0.328125	13/16	0.8125
11/32	0.34375	53/64	0.828125
23/64	0.359375	27/32	0.84375
3/8	0.375	55/64	0.859375
25/64	0.390625	7/8	0.875
13/32	0.40625	57/64	0.890625
27/64	0.421875	29/32	0.90625
7/16	0.4375	59/64	0.921875
29/64	0.453125	15/16	0.9375
15/32	0.46875	61/64	0.953125
31/64	0.484375	31/32	0.96875
		63/64	0.984375

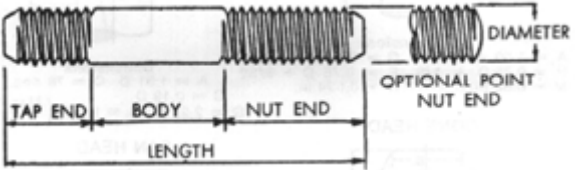
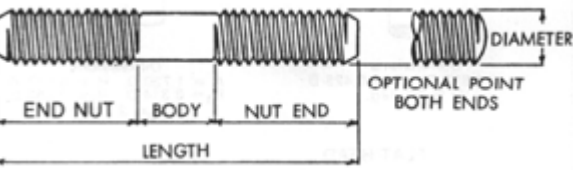
Thread Terminology

	<p>A. FULL DIAMETER SHANK: Equal to major diameter of thread. Produced by cut thread or by roll thread on extruded blank. Characteristic of machine bolts and cap screws.</p>	<p>ROLLED THREAD: Threads are cold formed by squeezing the blank between reciprocating serrated dies. This acts to increase the major diameter of the thread over and above the diameter of unthreaded shank (if any), unless an extruded blank is used.</p>
	<p>B. UNDERSIZED SHANK: Equal approximately to pitch diameter of thread. Produced by roll threading a non-extruded blank. Characteristic of machine screws.</p>	<p>Classes of thread are distinguished from each other by the amounts of tolerance and allowance specified. External threads or bolts are designated with the suffix "A"; internal or nut threads with "B".</p>
	<p>C. PITCH: The distance from a point on the screw thread to a corresponding point on the next thread measured parallel to the axis.</p>	<p>CLASSES 1A and 1B: For work of rough commercial quality where loose fit for spin-on-assembly is desirable.</p>
	<p>D. PITCH DIAMETER: The simple, effective diameter of screw thread. Approximately half way between the major and minor diameters.</p>	<p>CLASSES 2A and 2B: The recognized standard for normal production of the great bulk of commercial bolts, nuts and screws.</p>
	<p>E. MAJOR DIAMETER: The largest diameter of a screw thread.</p>	<p>CLASSES 3A and 3B: Used where a closed fit between mating parts for high quality work is required.</p>
	<p>F. MINOR DIAMETER: The smallest diameter of a screw thread.</p>	<p>CLASS 4: A theoretical rather than practical class, now obsolete.</p>
	<p>LEAD: The distance a screw thread advances axially in one turn.</p>	<p>CLASS 5: For a wrench fit. Used principally for studs and their mating tapped holes. A force fit requiring the application of high torque for semi-permanent assembly.</p>
	<p>CUT THREAD: Threads are cut or chased; the unthreaded portion of shank will be equal to major diameter of thread.</p>	

TYPES OF STUDS

Continuous Thread Studs

 <p style="text-align: center;">LENGTH OVERALL</p>	 <p style="text-align: center;">LENGTH - 1st THREAD TO 1st THREAD</p>
Type 1	Type 2
<p>Continuous-thread studs are threaded from end to end and are often used for flange bolting with two nuts applied.</p>	
<p>Type 1 - General purpose. The length of this type is measured from end to end. Threads are UNRC-2A.</p>	<p>Type 2 - Studs for temperature-pressure piping. These studs are made to the dimensional standard requirements of ANS B16.5 and have a length measurement requirement different from all other studs, i.e., the length is measured from first thread to first thread, exclusive points. Points are flat and chamfered. Threads are UNRC-2A for all sizes 1 in. and under and 8UNR-2A for all sizes over 1 in.</p>

<h4>Tap-end Studs</h4>  <p style="text-align: center;">LENGTH</p>	<h4>Double-end Studs</h4>  <p style="text-align: center;">LENGTH</p>
<p>Tap-end studs have a short thread on one end, called the tap end which is threaded to a Class NC5 or Class UNRC-3A fit. This end is for screwing into a tapped hole. The other or nut end is threaded with a Class UNRC-2A fit. Length of the stud is measured overall. The tap end has a chamfered point, but the nut end may have either a chamfered or round point, at the manufacturer's option. Tap-end studs</p>	<p>Double-end studs have equal-length threads on each end to accommodate a nut and are threaded to a Class 2A fit. Length of stud is measured overall. Both ends have chamfered points, but round points may be furnished on either or both ends at the manufacturer's option. This style is furnished in the same four types listed for tap-end studs. Double-end studs are used for flange bolting or other</p>

are available in four types, as follows:

Type 1 - Unfinished, have a full diameter but no standard body tolerances.

Type 2 - Finished, having either an undersize body with rolled threads or a full-size body with cut threads, at the manufacturer's option. The body portion will be finished to a maximum Class 2A pitch diameter or maximum basic major diameter of the nut-end thread.

Type 3 - Finished, full-body, having tolerances equal to that on major diameter of Class 2A threads.

Type 4 - Finished close-body, milled or ground to tolerances specified by the user.

applications where torching from both ends is necessary or desirable.

Most steel grades not heat treated or quenched and tempered can be furnished on special order for production quantities. Only the Type 2 continuous thread studs made to specification ASTM A193 grade B7 are stocked in a full range of sizes.

Tap end and double end studs are available only on special order.

hope You found the information helpful.
Be good to your brother, the rest, watch your ass.

Sincerely,



Howard G. Messner President