

Grade Identification Markings for Carbon Steel Externally Threaded Fasteners

Grade Identification Marking	Specification	Material	Nominal Size in.	Proof Load Stress ksi	Tensile Strength Min ksi	Hardness Rockwell		See Note
						Min	Max	
 No Mark	SAE J429 - Grade 1	Low or Medium Carbon Steel	1/4 thru 1 1/2	33	60	B70	B100	
	SAE J429 - Grade 2		1/4 thru 3/4 over over 3/4 thru 1 1/2	55	74	B80	B100	
	ASTM A307 - Grade A		1/4 thru 4	–	60	B69	B100	
	ASTM A307 - Grade B		1/4 thru 4	–	60 Min 100 Max	B69	B95	
	SAE J429 - Grade 5 ASTM A449 - Type 1	Medium Carbon Steel, Quenched and Tempered	1/4 thru 1 over 1 thru 1 1/2	85 74	120 105	C25	C34	
	ASTM A449 - Type 1		over 1 1/2 thru 3	55	90	183	235	3
	SAE J429 - Grade 5.1	Low or Medium Carbon Steel, Quenched and Tempered	N0.6 Thru 1/2	85	120	C25	C40	4
	SAE J429 - Grade 5.2 ASTM A449 - Type2	Low Carbon Martensite Steel, Quenched and Tempered	1/4 thru 1	85	120	C26	C36	
						C25	C34	
	ASTM A325 - Type 1	Medium Carbon Steel Quenched and Tempered						5
	ASTM A325 - Type 2	Low Carbon Martensite Steel, Quenched and Tempered	1/2 Thru 1 over 1 to 1 1/2	85	120	C24	C35	
				74	105	C19	C31	
	ASTM A325 - Type 3	Atmospheric Corrosion Resistant Steel, Quenched and Tempered						6
	ASTM A354 - Grade BC	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 2 1/2 over 2 1/2 thru 4	105 95	125 115	C26 C22	C36 C33	
	SAE J429 - Grade 8	Medium Carbon Alloy Steel, Quenched and Tempered	1/4 thru 1 1/2	120	150	C33	C39	
	ASTM A354 - Grade BD		1/4 thru 2 1/2 over 2 1/2 thru 4	120 105	150 140	C33 C31	C39 C39	7
	SAE J429 - Grade 8.2	Low Carbon Martensite Alloy Steel, Quenched and Tempered	1/4 thru 1	120	150	C33	C39	
	ASTM A490 - Type 1	Medium Carbon Alloy Steel, Quenched and Tempered	1/2 Thru 1 1/2	120	150 Min 170 Max	C33	C38	
	ASTM A490 - Type 2	Low Carbon Martensite Steel, Quenched and Tempered	1/2 Thru 1	120	150 Min 170 Max	C33	C38	
	ASTM A490 - Type 3	Atmospheric Corrosion Resistant Steel, Quenched and Tempered	1/2 Thru 1	120	150 Min 170 Max	C33	C38	6

- NOTES:**
- In addition to the indicated grade marking, all grades included in this Table must be marked for manufacturer identification.
 - While hex heads are shown, grade markings apply equally to products with other head configurations.
 - Hardnesses are Brinell Hardness Numbers.
 - Grade 5.1 is a popular grade for sems
 - A325 Type 1 bolts may also be marked with 3 radial lines 1200 apart in addition to the A325 marking.
 - The bolt manufacturer, at his option, may add other markings to indicate the use of atmospheric corrosion resistant steel.
 - A354 Grade BD products, in sizes 1 1/2 in. and smaller, are identified as shown and, at the manufacturers option, may have the letters BD added. Larger sizes are marked only BD.



CARBON STEEL BOLTS PROOF AND TENSILE STRENGTHS



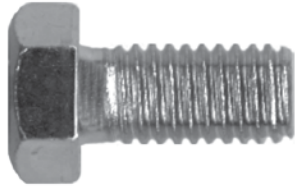
PROOF LOAD AND TENSILE STRENGTH REQUIREMENTS (a)

Nominal Dia of Product and Threads per in.	Stress Area, in. ²	Grade 1		Grade 2		Grade 4		Grades 5 and 5.2 ^B		Grade 5.1		Grade 7		Grades 8, 8.1, 8.2 ^B	
		Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb	Proof Load, lb	Tensile Strength Mm, lb
Coarse Thread Series - UNC															
No.6-32	0.00909	-	-	-	-	-	-	-	-	750	1,100	-	-	-	-
8-32	0.0140	-	-	-	-	-	-	-	-	1,200	1,700	-	-	-	-
10-24	0.0175	-	-	-	-	-	-	-	-	1,500	2,100	-	-	-	-
12-24	0.0242	-	-	-	-	-	-	-	-	2,050	2,900	-	-	-	-
1/4-20	0.0318	1,050	1,900	1,750	2,350	2,050	3,650	2,700	3,800	2,700	3,800	3,350	4,250	3,800	4,750
5/16-18	0.0524	1,750	3,150	2,900	3,900	3,400	6,000	4,450	6,300	4,450	6,300	5,500	6,950	6,300	7,850
3/8-16	0.0775	2,550	4,650	4,250	5,750	5,050	8,400	6,600	9,300	6,600	9,300	8,150	10,300	9,300	11,600
7/16-14	0.1063	3,500	6,400	5,850	7,850	6,900	12,200	9,050	12,800	9,050	12,800	11,200	14,100	12,800	15,900
1/2-13	0.1419	4,700	8,500	7,800	10,500	9,200	16,300	12,100	17,000	12,100	17,000	14,900	18,900	17,000	21,300
9/16-12	0.182	6,000	10,900	10,000	13,500	11,800	20,900	15,500	21,800	15,500	21,800	19,100	24,200	21,800	27,300
5/8-11	0.226	7,450	13,600	12,400	16,700	14,700	25,400	19,200	27,100	19,200	27,100	23,700	30,100	27,100	33,900
3/4-10	0.334	11,000	20,000	18,400	24,700	21,700	38,400	28,400	40,100	-	-	35,100	44,400	40,100	50,100
7/8-9	0.462	15,200	27,700	15,200	27,700	30,000	53,100	39,300	55,400	-	-	48,500	61,400	55,400	69,300
1-8	0.606	20,000	36,400	20,000	36,400	39,400	69,700	51,500	72,700	-	-	63,800	80,600	72,700	90,900
1-1/8-7	0.763	25,200	45,800	25,200	45,800	49,600	87,700	56,500	80,100	-	-	80,100	101,500	91,600	114,400
1-1/4-7	0.969	32,000	58,100	32,000	58,100	63,000	111,400	71,700	101,700	-	-	101,700	127,700	116,300	145,400
1-3/8-6	1.155	38,100	69,300	38,100	69,300	75,100	132,800	85,500	121,300	-	-	121,300	153,600	138,600	173,200
1-1/2-6	1.405	46,400	84,300	46,400	84,300	91,300	161,600	104,000	147,500	-	-	147,500	186,900	168,600	210,800
Fine Thread Series - UNF															
No.6-40	0.01015	-	-	-	-	-	-	-	-	850	1,200	-	-	-	-
8-38	0.01474	-	-	-	-	-	-	-	-	1,250	1,750	-	-	-	-
10-32	0.0200	-	-	-	-	-	-	-	-	1,700	2,400	-	-	-	-
12-28	0.0258	-	-	-	-	-	-	-	-	2,200	3,100	-	-	-	-
1/4-28	0.0364	1,200	2,200	2,000	2,700	2,350	4,200	3,100	4,350	3,100	4,350	3,800	4,850	4,350	5,450
5/16-24	0.0580	1,900	3,500	3,200	4,300	3,750	6,700	4,900	6,950	4,900	6,950	6,100	7,700	6,950	8,700
3/8-24	0.0878	2,900	5,250	4,800	6,500	5,700	10,100	7,450	10,500	7,450	10,500	9,200	11,700	10,500	13,200
7/16-20	0.1187	3,900	7,100	6,550	8,800	7,700	13,650	10,100	14,200	10,100	14,200	12,500	15,800	14,200	17,800
1/2-20	0.1599	5,300	9,600	8,800	11,800	10,400	18,400	13,600	19,200	13,600	19,200	16,800	21,300	19,200	24,000
9/16-18	0.203	6,700	12,200	11,200	15,000	13,200	23,300	17,300	24,400	17,300	24,400	21,300	27,000	24,400	30,400
5/8-18	0.256	8,450	15,400	14,100	18,900	16,600	29,400	21,800	30,700	21,800	30,700	26,900	34,000	30,700	38,400
3/4-16	0.373	12,300	22,400	20,500	27,600	24,200	42,900	31,700	44,800	-	-	39,200	49,600	44,800	56,000
7/8-14	0.509	16,800	30,500	16,800	30,500	33,100	58,500	43,300	61,100	-	-	53,400	67,700	61,100	76,400
1 -12	0.663	21,900	39,800	21,900	39,800	43,100	76,200	56,400	79,600	-	-	69,600	88,200	79,600	99,400
1-1/4 uns	0.679	22,400	40,700	22,400	40,700	44,100	78,100	57,700	81,500	-	-	71,300	90,300	81,500	101,900
1-1/8-12	0.856	28,200	51,400	28,200	51,400	55,600	98,400	83,300	89,900	-	-	89,900	113,800	102,700	128,400
1-1/4-12	1.073	35,400	64,400	35,400	64,400	69,700	123,400	79,400	112,700	-	-	112,700	142,700	128,800	161,000
1-3/8-12	1.315	43,400	78,900	43,400	78,900	85,500	151,200	97,300	138,100	-	-	138,100	174,900	157,800	197,200
1-1/2-12	1.581	52,200	94,900	52,200	94,900	102,800	181,800	117,000	116,000	-	-	166,000	210,300	189,700	237,200

A) Proof loads and tensile strengths are computed by multiplying the proof load stresses and tensile strength stresses given in Table 1 by the stress area of the thread.

The stress area of sizes and thread series not included in this table may be computed from the formula: $A_s = 0.7854 [D - \frac{0.9743}{n}]^2$ where D equals nominal diameter in inch, and n equals threads per inch.

B) Grades 5.2 and 8.2 applicable to sizes 1/4 through 1 in.



**MECHANICAL REQUIREMENTS FOR STAINLESS
STEEL BOLTS, SCREWS, STUDS AND NUTS**

Grade ¹	General Description	Mechanical Requirements							
		Bolts ¹ Screws And Studs					Nuts		
		Full Size Bolts, Screws, Studs		Machined Test Specimens Of Bolts, Screws, Studs					
		Yield ² Strength min ksi	Tensile Strength min ksi	Yield ² Strength min ksi	Tensile Strength min ksi	Elongation ³ % Min	Hardness Rockwell Min	Proof Load Stress ksi	Hardness Rockwell Min
303-A	Austenitic Stainless Steel Sol. Annealed	30	75	30	75	20	B75	75	B75
304-A	Austenitic Stainless Steel Sol. Annealed	30	75	30	75	20	B75	75	B75
304	Austenitic Stainless Steel Cold Worked	50	90	45	85	20	B85	90	B85
305-A	Austenitic Stainless Steel Sol. Annealed	30	75	20	75	20	B70	75	B70
305	Austenitic Stainless Steel Cold Worked	50	90	45	85	20	B85	90	B85
316-A	Austenitic Stainless Steel Sol. Annealed	30	75	30	75	20	B70	75	B70
316	Austenitic Stainless steel Sol. Annealed	50	90	45	85	20	B85	90	B85
316-SH	Austenitic Stainless Steel Strain Hardened	See Note 6	See Note 6	See Note 6	See Note 6	15	C25	See Note 6	C20
410-H	Stainless Steel Hardened and Tempered	95	125	95	125	20	C22	125	C22
410-HT	Martensitic Stainless Steel Hardened and Tempered	135	180	135	180	12	C36	180	C36
416-H	Martensitic Stainless Steel Hardened and Tempered	95	125	95	125	20	C22	125	C22
416-HT	Martensitic Stainless Steel Hardened and Tempered	135	180	135	180	12	C36	150	C36
430	Ferritic Stainless Steel	40	70	40	70	20	B75	70	B75