

Common Specifications for Use with Fasteners

ASTM Specifications			
A36	Specification for Carbon Structural Steel	B695	Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
A153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware	F436	Specification for Hardened Steel Washers
A193	Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service	F467	Specification for Nonferrous Nuts for General Use
A194	Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service	F468	Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
A307	Specification for Steel Bolts and Studs, 60,000 PSI Tensile Strength	F593	Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
A320	Specification for Alloy Steel Bolting Materials for Low-Temperature Service	F594	Specification for Stainless Steel Nuts
A325	Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength	F606	Test Methods for Determining Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets
A354	Specification for Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners	F835	Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
A370	Test Methods and Definitions for Mechanical Testing of Steel Products	F837	Specification for Stainless Steel Socket Head Cap Screws
A394	Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare	F844	Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
A449	Specification for Quenched and Tempered Steel Bolts and Studs	F879	Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws
A489	Specification for Carbon Steel Lifting Eyes	F880	Specification for Stainless Steel Socket-Set Screws
A490	Specification for Heat-Treated Structural Bolts, 150 KSI Tensile Strength	F912	Specification for Alloy Steel Socket Set Screws
A563	Specification for Carbon and Alloy Steel Nuts	F959	Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
A574	Specification for Alloy Steel Socket Head Cap Screw	F1554	Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength
B633	Specification for Electrodeposited Coatings of Zinc on Iron and Steel	F1852	Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
		F1941	Electrodeposited Coatings on Thread Fasteners [Unified Inch Screw Threads (UN/UNR)]

SAE Standards			
J58	Flanged 12 Point Screws	J487	Cotter Pins
J78	Steel Self-Drilling Tapping Screws	J493	Rod Ends and Clevis Pins
J81	Thread Rolling Screws	J933	Mechanical and Quality Requirements for Tapping Screws
J429	Mechanical and Material Requirements for Externally Threaded Fasteners	J995	Mechanical and Material for Steel Nuts

ANSI (and/or) ASME Standards (inch series)			
B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)	B18.6.4	Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws
B1.12	Class 5 Interference-Fit Thread	B18.7	General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps
B1.15	Unified Inch Screw Threads (UNJ Thread Form)	B18.8.1	Clevis Pins and Cotter Pins
B18.1.1	Small Solid Rivets	B18.8.2	Taper Pins, Dowel Pins, Straight Pins, Grooved Pins and Spring Pins
B18.1.2	Large Rivets	B18.9	Plow Bolts
B18.2.1	Square and Hex Bolts and Screws	B18.10	Track Bolts and Nuts
B18.2.2	Square and Hex Nuts	B18.11	Miniature Screws
B18.2.6	Fasteners for Use in Structural Applications	B18.13	Screw and Washer Assemblies (Sems)
B18.3	Socket Cap, Shoulder and Set Screws	B18.15	Forged Eyebolts
B18.5	Round Head Bolts	B18.17	Wing Nuts, Thumb Screws and Wing Screws
B18.6.1	Wood Screws	B18.21.1	Lock Washers
B18.6.2	Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws	B18.22.1	Plain Washers
B18.6.3	Machine Screws and Machine Screw Nuts	B18.23.1	Beveled Washers

Mechanical Specifications for Externally Threaded Fasteners with Grade Markings





Specification	Material	Size Range (in.)	Min. Proof Strength (psi)	Min. Tensile Strength (psi)	Core Hardness Rockwell		Min. Yield Strength (psi)	Grade Identification Marking
					Min.	Max.		
SAE J429-Grade 1	Low or medium carbon steel	1/4 - 1 1/2	33,000	60,000	B70	B100	36,000	
SAE J429-Grade 2		1/4 - 3/4	55,000	74,000	B80	B100	57,000	
		7/8 - 1 1/2	33,000	60,000	B70	B100	36,000	
ASTM A307-Grade A	Low or medium carbon steel	1/4 - 4		60,000	B69	B100		
ASTM A307-Grade B	Low or medium carbon steel	1/4 - 4		60,000(min) 100,000(max)	B69	B95		
SAE J429-Grade 5 ASTM A449-Type 1	Medium carbon steel: quenched & tempered	1/4 - 1	85,000	120,000	C25	C34	92,000	
ASTM A449-Type 1		1 1/8 - 1 1/2	74,000	105,000	C19	C30	81,000	
		1 3/4 - 3	55,000	90,000			58,000	
ASTM A325-Type 1	Medium carbon steel: quenched & tempered	1/2 - 1 1 1/8 - 1 1/2	85,000 74,000	120,000 105,000	C25 C19	C34 C30	92,000 81,000	
ASTM A354 Grade BC	Medium carbon alloy steel: quenched & tempered	1/4 - 2 1/2 Over 2 1/2 - 4	105,000 95,000	125,000 115,000	C26 C22	C36 C33	109,000 99,000	
ASTM A354 Grade BD	Medium carbon alloy steel: quenched & tempered	1/4 - 2 1/2 Over 2 1/2 - 4	120,000 105,000	150,000 140,000	C33 C31	C39 C39	130,000 115,000	 See Note 1
SAE J429-Grade 8	Medium carbon alloy steel: quenched & tempered	1/4 - 1 1/2	120,000	150,000	C33	C39	130,000	
SAE J429-Grade 8.2	Low carbon boron steel: quenched & tempered	1/4 - 1	120,000	150,000	C33	C39	130,000	
ASTM A490-Type 1	Medium carbon alloy steel: quenched & tempered	1/2 - 1 1/2	120,000	150,000(min) 173,000(max)	C33	C39	130,000	
ASTM A574 Alloy Steel Socket Head Cap Screw	Medium carbon alloy steel: quenched & tempered	#0 - 1/2 over 1/2 - 2	140,000 135,000	180,000 170,000	C39 C37	C45 C45	153,000	
ASTM F835 Alloy Steel Socket Button & Flat Countersunk Head Cap Screw	Medium carbon alloy steel: quenched & tempered	#0 - 1/2 Over 1/2		145,000 135,000	C39 C37	C44 C44		

Note 1: ASTM A354-Grade BD shall be marked "BD", and in addition to "BD", the product may be marked six radial lines 60° apart.

Material Specification

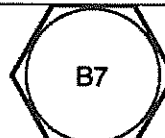
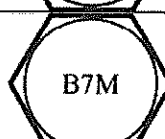
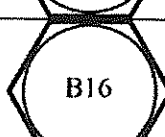
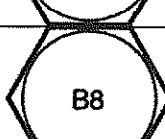
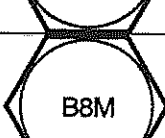
Specification	Material	Tensile Strength (psi)	Min. Yield Strength (psi)
ASTM A36	Carbon Structural Steel	58,000 (min.) - 80,000 (max.)	36,000

Mechanical Properties of Common Stainless Steel Fasteners in Accordance with ASTM F593

Stainless Alloy Group	Condition	Nominal Dia. (in.)	Tensile Strength (psi)	Core Hardness Rockwell		Min. Yield Strength (psi)	Grade Identification Marking
				Min.	Max.		
1 (303, 304, 304L, 305, 384, XM1, 18-9LW, 302HQ, 303Se)	CW	1/4 - 5/8	100,000 - 150,000	B95	C32	65,000	
	CW	3/4 - 1 1/2	85,000 - 140,000	B80	C32	45,000	
2 (316, 316L)	CW	1/4 - 5/8	100,000 - 150,000	B95	C32	65,000	
	CW	3/4 - 1 1/2	85,000 - 140,000	B80	C32	45,000	

CW: headed and rolled from annealed or solution-annealed stock

ASTM A193: Alloy Steel and Stainless Steel Bolting Material For High-Temperature Service

Specification & Grade	Size Range (in.)	Min. Tensile Strength (psi)	Min. Yield Strength (psi)	Core Hardness Rockwell (max)	Description	Grade Identification Marking
ASTM A193 B7	2 1/2 & under	125,000	105,000	C35	Chromium-Molybdenum alloy (4140, 4142, 4145, 4140H, 4142H, 4145H) used for high-pressure, high-temperature applications.	
	Over 2 1/2 - 4	115,000	95,000	C35		
	Over 4 - 7	100,000	75,000	C35		
ASTM A193 B7M	4 & under	100,000	80,000	B99	Similar to B7 except heat-treated to limit the maximum hardness. Considered in areas where stress embrittlement may be a factor.	
	Over 4 - 7	100,000	75,000	B99		
ASTM A193 B16	2 1/2 & under	125,000	105,000	C35	A chromium-Molybdenum-Vanadium alloy used for high-pressure, high-temperature service applications. Offers slightly higher temperature resistance than B7.	
	Over 2 1/2 - 4	110,000	95,000	C35		
	Over 4 - 8	100,000	85,000	C35		
ASTM A193 B8 Class 1	1/4 & larger	75,000	30,000	B96	A 304 Stainless Steel used for high temperature applications. This material has been carbide solution treated.	
ASTM A193 B8M Class 1	1/4 & larger	75,000	30,000	B96	A 316 Stainless Steel used for high temperature applications. This material has been carbide solution treated.	

Mechanical Properties for ASTM F1554

Grade	SIZE (inches)	Tensile, ksi	Yield, ksi
36	1/4-4	58-80	36
55	1/4-4	75-95	55
105	1/4-4	125-150	105