

Bolt Grades - Head Marking and Rod End Reference Guide












Bolts and Rod Ends Specification Data




US Grade Bolt Markings - Strength Requirements

Head Grade Marking	Specification	Material	Nominal Size (Inches)	Proof Load psi	Tensile Strength Min psi	Yield Strength Min psi	Rockwell Hardness (Min/Max)
	Grade 1 - SAE J429 Bolts, Screws and Studs	Low or medium carbon steel	1/4" - 1-1/2"	33,000	60,000	36,000	B70 / B100
	Grade 2 - SAE J429 Bolts, Screws and Studs	Low or medium carbon steel	1/4" - 3/4" >3/4" - 1-1/2"	55,000 33,000	74,000 60,000	57,000 36,000	B80 / B100 B70 / B100
	Grade 5 - SAE J429 Bolts, Screws and Studs	Medium carbon steel or carbon steel with additives, quenched and tempered	1/4" - 1" >1" - 1-1/2"	85,000 74,000	120,000 105,000	92,000 81,000	C25 / C34 / C19 / C30
	Grade 5.1 - SAE J429 Sems	Low or medium carbon steel, quenched and tempered	No. 4 - 5/8"	85,000	120,000	92,000	C25 / C40
	Grade 5.2 - SAE J429 Bolts, Screws and Studs	Low carbon Boron steel, quenched and tempered	1/4" - 1"	85,000	120,000	92,000	C26 / C36
	Grade 8 - SAE J429 Bolts and Screws	Medium carbon / alloy steel with additives, quenched and tempered	1/4" - 1-1/2"	120,000	150,000	130,000	C33 / C39
	Grade 8.2 - SAE J429 Bolts and Screws	Low carbon Boron steel, quenched and tempered	1/4" - 1"	120,000	150,000	130,000	C33 / C39
	L9 - Grade 9 Bolts, Nuts and Washers	High strength alloy steel	1/4" - 1-1/2"	145,000	180,000	155,000	C38 / C42
	ASTM A307 Grade A Bolts, Screws and Studs (General Engineering)	Low or medium carbon steel	1/4" - 4"	33,000	60,000	36,000	B69 / B100
	ASTM A307 Grade B Bolts, Screws and Studs (Flanged Joints)	Low or medium carbon steel	1/4" - 4"	33,000	60,000	36,000	B69 / B95
	ASTM A307 Grade C	Low or medium carbon steel	1/2" - 4"	-	58 min 80 max	36,000	-






A307C

One End Green

Head Grade Marking	Specification	Material	Nominal Size (Inches)	Proof Load psi	Tensile Strength Min psi	Yield Strength Min psi	Rockwell Hardness (Min/Max)
 One End Blue	ASTM F1554 Grade 36	Low or medium carbon steel	1/2" - 4"	-	58 min 80 max	36,000	-
 One End Yellow	ASTM F1554 Grade 55	Low or medium carbon steel	1/2" - 2" 2-1/4" - 2-1/2" 3-3/4" - 3" 3-1/4" - 4"	-	75 min 95 max	55,000	-
	ASTM A325 Type 1 High strength structural bolts	Medium carbon steel, quenched and tempered	1/2" - 1" 1-1/8" - 1-1/2"	85,000 74,000	120,000 105,000	92,000 81,000	C24 / C35 / C19 / C31
	ASTM A325 Type 2 High strength structural bolts	Low carbon Martensitic steel, quenched and tempered	1/2" - 1" 1-1/8" - 1-1/2"	85,000 74,000	120,000 105,000	92,000 81,000	C24 / C35 / C19 / C31
	ASTM A325 Type 3 High strength structural bolts	Atmospheric corrosion-resistant steel, quenched and tempered	1/2" - 1" 1-1/8" - 1-1/2"	85,000 74,000	120,000 105,000	92,000 81,000	C24 / C35 / C19 / C31
	ASTM A354 Grade BB Bolts and studs	Alloy steel, quenched and tempered	1/4" - 2-1/2" > 2-1/2" - 4"	80,000 75,000	105,000 100,000	83,000 78,000	C26 / C36 / C22 / C33
	ASTM A354 Grade BC Bolts and studs	Alloy steel, quenched and tempered	1/4" - 2-1/2" > 2-1/2" - 4"	105,000 95,000	125,000 115,000	109,000 99,000	C26 / C36 / C22 / C33
 One End Red	ASTM F1554 Grade 105	Medium carbon steel, Alloy Steel Q & T	1/2" - 3"	-	128 min 150 max	105,000	-
	ASTM A354 Grade BD Bolts, screws and studs	Alloy steel, quenched and tempered	1/4" - 2-1/2" > 2-1/2" - 4"	120,000 105,000	150,000 140,000	130,000 120,000	C33 / C39 / C31 / C39
	ASTM A449 Type 1 Bolts, screws and studs	Medium carbon steel, quenched and tempered	1/4" - 1" > 1 - 1-1/2"	85,000 74,000	120,000 105,000	92,000 81,000	C25 / C34 C25 / C34
	ASTM A449 Type 2 Bolts, Screws and studs	Low carbon Martensitic steel, quenched and tempered	1/4" - 1"	85,000	120,000	58,000	C25 / C34

Head Grade Marking	Specification	Material	Nominal Size (Inches)	Proof Load psi	Tensile Strength Min psi	Yield Strength Min psi	Rockwell Hardness (Min/Max)
	ASTM A490 Type 1 High strength structural bolts	Medium carbon alloy steel, quenched and tempered	1/2" - 1-1/2"	120,000	150,000 min 170,000 max	130,000	C33 / C38
	ASTM A490 Type 2 High strength structural bolts	Low carbon Martensitic steel, quenched and tempered	1/2" - 1"	120,000	150,000 min 170,000 max	130,000	C33 / C38
	ASTM A490 Type 3 High strength structural bolts	Atmospheric corrosion-resistant steel, quenched and tempered	1/2" - 1-1/2"	120,000	150,000 min 170,000 max	130,000	C33 / C38

Metric Bolts

Head Grade Marking	Specification	Material	Proof Load (Min)	Tensile Strength min (MPa)	Yield Strength Min (MPa)	Hardness Min/Max
	Class 4.6	Low or medium carbon steel	220	400 (58,000 psi)	240	HRB-67 / HRB-95
	Class 5.8	Low or medium carbon steel, quenched and tempered	380	520 (75,000 psi)	420	HRB-82 / HRB-95
	Class 8.8	Medium carbon steel, quenched and tempered	600	830 (120,000 psi)	640	HRC-22 / HRC-34
	Class 10.9	Alloy steel, quenched and tempered	830	1040 (150,000 psi)	940	HRC-32 / HRC-39
	Class 12.9	Alloy steel, quenched and tempered	970	1220 (176,000 psi)	1220	HRC-39 / HRC-44
Usually stamped A-2 or A-4	A2 & A4 Stainless	Steel alloy with chromium and nickel	N/A	500 Min 700 Typical	210 Min 450 Typical	N/A

Note: Manufacturer's identification mark are also stamped when applicable.

Tensile Strength: The maximum load in tension (pull apart) which a material can withstand before breaking or fracturing.

Yield Strength: The stress at which a specific amount of permanent deformation is produced

Proof Load: An axial tensile load which the product must withstand without evidence of any permanent set.