

Bolt Grade Markings and Strength Chart

Tip: Set your PDF viewer to "Actual size" before printing to maintain scale.

Understanding bolt grade markings is essential for selecting the right fastener for your application. This chart shows SAE (US) grades and ISO metric property classes with their strength specifications.

US/SAE Bolt Grades

Grade	Head Marking	Material	Tensile Strength	Proof Load	Common Uses
Grade 2	No marks	Low carbon steel	64,000 psi	33,000 psi	General purpose, light-duty
Grade 5	3 radial lines	Medium carbon steel	120,000 psi	85,000 psi	Automotive, construction
Grade 8	6 radial lines	Med. carbon alloy steel	150,000 psi	120,000 psi	High-stress applications
18-8 SS	"18-8" or "A2"	304 Stainless steel	90,000 psi	65,000 psi	Corrosion resistance
316 SS	"316" or "A4"	316 Stainless steel	90,000 psi	65,000 psi	Marine, chemical resistance

Metric Property Classes (ISO 898-1)

Class	Head Marking	Material	Tensile Strength	Proof Load	US Equivalent
4.6	4.6	Low carbon steel	400 MPa (58 ksi)	240 MPa	~Grade 2
4.8	4.8	Low carbon steel	420 MPa (61 ksi)	310 MPa	~Grade 2
8.8	8.8	Medium carbon steel	800 MPa (116 ksi)	600 MPa	~Grade 5
10.9	10.9	Alloy steel, quenched	1000 MPa (145 ksi)	830 MPa	~Grade 8
12.9	12.9	Alloy steel, quenched	1200 MPa (174 ksi)	970 MPa	Higher than Grade 8

Important Notes:

- **Tensile Strength:** Maximum load bolt can withstand before breaking
- **Proof Load:** Maximum load without permanent deformation (working load should be below this)
- **Grade Marking:** Always check head markings to identify bolt grade
- **Substitution:** Never substitute a lower grade for specified higher grade bolt
- **Torque Values:** Proper torque varies by grade - refer to torque specifications chart

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Strength Comparison: Grade 2 vs. Grade 5 vs. Grade 8

Grade/Class	Tensile Strength	How Much Stronger?	Example
Grade 2 / 4.6	64,000 psi 400 MPa	Baseline (1×)	Can hold 1,000 lbs
Grade 5 / 8.8	120,000 psi 800 MPa	88% stronger (1.88× Grade 2)	Can hold 1,880 lbs
Grade 8 / 10.9	150,000 psi 1000 MPa	134% stronger (2.34× Grade 2)	Can hold 2,340 lbs

Key Point: A Grade 8 bolt is more than twice as strong as a Grade 2 bolt of the same size. Grade 5 falls in between.