







Threads and Materials (continued)
Inch and Metric Fastener Identification
Strength Levels and Markings

IDENTIFICATION GRADE MARK	Specification	Fastener Description	Material	Nominal Size Range Diameter	Proof Load (psi)	Yield Strength Min. (psi)	Tensile Strength Min. (psi)
	Grade 2	Bolts Screws Studs	Low or Medium Carbon Steel	1/4 - 3/4 Over 3/4-1 1/2	55,000 33,000	57,000 36,000	74,000 60,000
	Grade 5	Bolts Screws Studs	Med. Carbon Steel Quenched and Tempered	1/4 - 1 Over 1 thru 1 1/2 Over 1 1/2 - 3	85,000 74,000 55,000	92,000 81,000 58,000	120,000 105,000 90,000
	Grade 8	Bolts Screws Studs	Med. Carbon Alloy Quenched & Tempered	1/4 through 1 1/2	120,000	130,000	150,000
	Socket Screw (no Grade Designation)	Socket Head Cap Screws	Alloy Steel Quenched and Tempered	#0 through 1/2		162,000 153,000	180,000 170,000

X- Denotes manufacturer's marking

IDENTIFICATION GRADE MARK	Specification	Fastener Description	Material	Proof Load Min. MPa	Yield Strength Min. MPa	Tensile Strength Min. MPa
	Property Class 5.8	Bolts Screws Studs	Low or Med Carbon Steel	380	420	520
	Property Class 8.8	Bolts Screws Studs	Med. Carbon Steel Quenched and Tempered	600	640	830
	Property Class 10.9	Bolts Screws Studs	Med. Carbon Alloy Steel Quenched and Tempered	830	940	1040
	Property Class 12.9	Socket Head Cap Screws	Alloy Steel Quenched and Tempered	970	1100	1220

Metric Property Class 12.9 socket head cap screws are roughly equivalent in tensile and yield strengths to the inch series standard. 1220 MPa equals 177,000 psi. Outside the US, socket head cap screws are also made in Property Class 8.8, a strength difference of over 30%.

Threads and Materials (continued)

Inch and Metric Fastener Identification

Measurement Terminology

Measure	Imperial Units	Metric Or SI Units
Length	inch (in)	millimeter (mm)
	foot (ft)	meter (m)
	1 inch = 25.4mm	
Area	inch ²	millimeter ²
	foot ²	meter ²
	1 inch² = 645.16 mm²	
Volume	inch ³	centimeter ³
	foot ³	meter ³
	1 inch³ = 16.387 cm³	
	US Gallon (gal)	Liter (l)
	1 US Gal. = 3.785 Liters	
Mass	pound (lb)	kilogram (kg)
1 pound = 0.45359 kg		
Force	pound force (lbf)	Newton (N)
	1 lbf = 4.4482 N	
	1 Newton = 0.225 pounds	
Torque	Pound/inch or pound/feet	Newton meters (Nm)
	1 Nm = 8.851 pound/inches	
	1 pound/foot = 1.355 Nm	
	1 pound/inch = 0.1129 Nm	
Stress or Pressure	pound/foot per inch ² (lbf/in ²)	Pascal (Pa)
	or psi	1MPa = 1 N/mm ²)
	1 psi = 6895 Pa 1 ksi = 6.895 MPa	

It should be noted that while conversions are shown here, that best practice is to keep measures in their original units. This is particularly important for torque to tension recommendations in which there is scatter already present in the methodology.