



SAE J429 Hex Cap Screws

Mechanical & chemical requirements · inch series, sizes through 1-1/2"



Grade 2
No markings



Grade 5
Three radial lines



Grade 8
Six radial lines

Mechanical properties

Grade	Nominal Size	Proof Load	Yield, min	Tensile, min	Elong, min	Core Hardness	Temper, min
Grade 2	1/4" thru 3/4"	55,000 psi	57,000 psi	74,000 psi	18%	B80–B100	—
	Over 3/4" thru 1-1/2"	33,000 psi	36,000 psi	60,000 psi	18%	B70–B100	—
Grade 5	1/4" thru 1"	85,000 psi	92,000 psi	120,000 psi	14%	C25–C34	800°F
	Over 1" thru 1-1/2"	74,000 psi	81,000 psi	105,000 psi	14%	C19–C30	800°F
Grade 8	1/4" thru 1-1/2"	120,000 psi	130,000 psi	150,000 psi	12%	C33–C39	800°F

Reduction of area: 35% min, all grades. Grade 2 values for 1/4"–3/4" apply to bolts 6" and shorter and studs of all lengths; for bolts longer than 6", Grade 1 requirements apply. Proof loads are full-size (tensile) values.

Chemical requirements

Grade	Material	Carbon	P, max	S, max	Head Marking
Grade 2	Low or medium carbon steel	0.15–0.55%	0.030%	0.050%	None
Grade 5	Medium carbon steel, Q&T	0.28–0.55%	0.030%	0.050%	3 radial lines
Grade 8	Medium carbon alloy steel, Q&T	0.28–0.55%	0.030%	0.050%	6 radial lines

Mating nut & alternate grades

Recommended nut: SAE J995 of matching or higher grade, so the nut is not the weak point in the joint.

Larger diameters: SAE J429 tops out at 1-1/2". Above that, the ASTM grades at right are the usual substitutes — similar in strength, not identical; confirm before swapping.

SAE Grade	ASTM Equivalent (over 1-1/2")
Grade 2	ASTM A307 Grade A or B
Grade 5	ASTM A449
Grade 8	ASTM A354 Grade BD