

SAE Grade 8 / ASTM A354 Grade BD Bolts (150 ksi) — Material Data Sheet

ASTM A354 Grade BD · SAE J429 Grade 8 · Alloy steel, quenched and tempered

Quenched-and-tempered alloy steel bolting, 150 ksi

The high-strength alloy bolt: quenched and tempered alloy steel at 150 ksi tensile and 130 ksi yield in all sizes to 4 in. — Grade 8 in SAE terms, A354 BD in ASTM terms.

TENSILE, ALL SIZES	150 ksi min (173 max)	ELONGATION · RA	14 % · 40 %
YIELD	130 ksi min	HEAD MARKING	Six radial lines (Grade 8) · BD
HARDNESS	33–38 HRC	MATCHING NUT	ASTM A563 Grade DH

Nominal composition

■ Fe balance ~ 98.9% ■ Mn ~ 0.60% ■ C, P, S, B trace

Midpoints of the specification ranges, for orientation only. Limits are in the table.

Chemical composition — ASTM A354 alloy steel (heat analysis)

Element	Symbol	Min %	Max %
Carbon	C	0.30	0.53
Manganese	Mn	0.60	—
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Boron	B	—	0.003
Alloying elements	—	per F1789 alloy definition	—

Values per ASTM A354-17 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Grade BD over 2¼ in. requires carbon 0.35–0.53 % and 0.40 % Ni, 0.40 % Cr and 0.15 % Mo minimum.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
THERMAL EXPANSION (68–212 °F)	6.5 µin/in·°F
MAGNETIC	Yes

Heat treatment

Quenched in liquid from above the transformation temperature and tempered at 800 °F minimum. Fasteners heat treated after threading are oil quenched. Plated parts are baked for hydrogen embrittlement relief.

Mechanical properties — ASTM A354 Grade BD (machined specimens) and hardness

Grade / condition and size	Tensile strength, min (ksi)	Yield or proof, min (ksi)	Elongation, min (%)	Reduction of area, min (%)	Hardness
Grade BD — all sizes to 4 in.	150 (173 max)	130	14	40	33–38 HRC (311–352 HBW)

Values per ASTM A354-17 Tables 2 and 4 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Full-size tensile and proof loads by thread size are in Table 3 of the specification.

Applicable standards

ASTM A354	Quenched and tempered alloy steel bolts, studs and other externally threaded fasteners
SAE J429 GRADE 8	Automotive and machinery designation for 150 ksi alloy bolts to 1½ in.
ASTM A563 GRADE DH	Matching heavy hex nuts
ASME B18.2.1	Hex cap screw and bolt dimensions

Forms we supply in Grade 8 / A354 BD

- Hex and heavy hex bolts and cap screws
- Studs and threaded rod
- Nuts and washers to match
- Machined specials to drawing

Typical applications

- Heavy equipment and mining machinery
- Crane, hoist and lifting hardware
- High-strength studs and tie rods
- Anchor and structural bolting over 1½ in. where A490 cannot be used
- Automotive and driveline bolting