

AISI 4140 Alloy Steel (UNS G41400) — Material Data Sheet

ASTM A322 bar · ASTM A434 Q&T bar · UNS G41400 · G41420 · AISI 4140 / 4142 chromium-molybdenum steel
Medium-carbon chromium-molybdenum alloy steel, supplied annealed, normalised or quenched and tempered

The workhorse Cr-Mo steel behind B7, L7 and Grade 7 — the bar stock for studs, shafts, couplings and any part that needs 100 to 150 ksi and good toughness.

A434 CLASS BC (<=1½ IN.)	130 ksi tensile · 110 ksi yield	CHROMIUM / MOLYBDENUM	0.80–1.10 / 0.15–0.25 %
A434 CLASS BD (<=1½ IN.)	155 ksi tensile · 130 ksi yield	BOLTING GRADES MADE FROM IT	A193 B7 · A320 L7 · A194 7
CARBON	0.38–0.43 %	MAGNETIC	Yes

Nominal composition



■ Fe balance ~ 97.3% ■ Cr ~ 0.95% ■ Mn ~ 0.88% ■ C, P, S, Si, Mo trace

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

Chemical composition — AISI 4140 (G41400) per ASTM A322 Table 1

Element	Symbol	Min %	Max %
Carbon	C	0.38	0.43
Manganese	Mn	0.75	1.00
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Chromium	Cr	0.80	1.10
Molybdenum	Mo	0.15	0.25

Values per ASTM A322-13(2018) Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. 4142 (G41420): carbon 0.40–0.45 %, otherwise identical.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
MAGNETIC	Yes

Heat treatment

Supplied annealed for machining, or quenched and tempered to an A434 class. Fasteners to A193, A320 or A194 are heat treated to those specifications after threading.

Quenched and tempered bar — ASTM A434 Class BC (4100 series)

Diameter (in.)	Yield strength, min (ksi)	Tensile strength, min (ksi)	Elongation, min (%)	Reduction of area, min (%)
1½ and under	110	130	16	50
Over 1½ to 2½	105	125	16	50
Over 2½ to 4	95	115	16	45
Over 4 to 7	85	110	16	45
Over 7 to 10	80	105	15	40

Values per ASTM A434/A434M-18 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Quenched and tempered bar — ASTM A434 Class BB (4100 series)

Diameter (in.)	Yield strength, min (ksi)	Tensile strength, min (ksi)	Elongation, min (%)	Reduction of area, min (%)
1½ and under	90	110	20	50
Over 1½ to 2½	80	105	20	50
Over 2½ to 4	75	100	20	50
Over 4 to 7	75	95	20	50
Over 7 to 10	65	90	18	40

Values per ASTM A434/A434M-18 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Quenched and tempered bar — ASTM A434 Class BD (4100 series)

Diameter (in.)	Yield strength, min (ksi)	Tensile strength, min (ksi)	Elongation, min (%)	Reduction of area, min (%)
1½ and under	130	155	14	35
Over 1½ to 2½	120	150	14	35
Over 2½ to 4	110	140	14	35
Over 4 to 7	105	135	14	35
Over 7 to 10	100	130	14	35

Values per ASTM A434/A434M-18 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A322	Hot-wrought alloy steel bars (grade chemistry)
ASTM A434 / A434M	Hot-wrought or cold-finished quenched-and-tempered alloy steel bars
ASTM A29	General requirements for carbon and alloy steel bars
ASTM A193 B7 / A320 L7 / A194 7	The bolting grades produced from 4140

Forms we supply in 4140

- Studs, bolts and threaded rod machined from bar
- Shafts, pins, couplings and machined components
- Certified A322 bar, annealed, normalised or quenched and tempered to A434

Typical applications

- Studs, bolts and threaded rod outside the ASTM bolting grades
- Pump and compressor shafts, couplings and pins
- Oil-tool and downhole components
- Gears, sprockets and machine parts
- Tooling and fixtures