

ASTM A193 Grade B6 (410 Stainless) — Material Data Sheet

ASTM A193 / ASME SA-193 · UNS S41000 · AISI 410 (martensitic stainless)
12–13 percent chromium martensitic stainless steel, hardened and tempered

Hardenable 410 stainless bolting — 110 ksi with corrosion resistance B7 lacks, for valve trim, steam and mildly corrosive service.

TENSILE (<=4 IN.)	110 ksi min	HEAT TREATMENT	Hardened and tempered, 1100 °F min
YIELD (<=4 IN.)	85 ksi min	COMPANION NUT	ASTM A194 6
HARDNESS (B6X)	26 HRC max (lower-strength variant)	MAGNETIC	Yes

Nominal composition

■ Fe balance ~ 86.3% ■ Cr ~ 12.50% ■ Mn ~ 0.50% ■ Si ~ 0.50% ■ C, P, S trace

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

Chemical composition — ASTM A193 B6 (AISI 410, UNS S41000)

Element	Symbol	Min %	Max %
Carbon	C	0.08	0.15
Manganese	Mn	—	1.00
Phosphorus	P	—	0.040
Sulfur	S	—	0.030
Silicon	Si	—	1.00
Chromium	Cr	11.5	13.5

Values per ASTM A193/A193M-24, Tables 1 and 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.280 lb/in ³ (7.75 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
THERMAL EXPANSION (68–212 °F)	5.5 µin/in·°F
MAGNETIC	Yes (ferromagnetic)

Heat treatment

Hardened and tempered at 1100 °F (593 °C) minimum, held at the tempering temperature for at least 1 hour. B6X is the lower-strength variant, tempered to 26 HRC maximum; it may be supplied as rolled and tempered, and cold worked after heat treatment provided the final hardness still meets the specification.

Mechanical properties — ASTM A193 B6 and B6X

Nominal diameter (in.)	Tensile strength, min (ksi)	Yield strength 0.2% offset, min (ksi)	Elongation in 4D, min (%)	Reduction of area, min (%)	Hardness, max
B6 — 4 and under	110	85	15	50	Not specified
B6X — 4 and under	90	70	16	50	26 HRC

Values per ASTM A193/A193M-24, Tables 1 and 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A193 / ASME SA-193	Alloy-steel and stainless steel bolting for high-temperature or high-pressure service
ASTM A194 GRADE 6 / 6F	Companion 410 stainless nuts
NACE MR0175 / ISO 15156	B6X (26 HRC max) is listed for sour service
ASTM A276 / A479	410 bar stock

Forms we supply in A193 B6

- Full-thread studs and stud bolts
- Double-end and tap-end studs
- Hex and heavy hex bolts
- Socket head cap screws
- Threaded rod (cut and rolled thread)
- Machined components from certified bar

Typical applications

- Valve bonnet and trim bolting
- Steam turbine and steam piping hardware
- Pump and compressor casings in mildly corrosive service
- Refinery and gas plant equipment (B6X for sour)
- Marine and outdoor equipment exposed to weather