

ASTM A193 Grade B8 Class 1 (304 Stainless) — Material Data Sheet

ASTM A193 / ASME SA-193 · UNS S30400 · AISI 304 (Class 1 and Class 2)

Austenitic 18-8 stainless steel; Class 1 solution treated, Class 2 strain hardened

304 stainless bolting — Class 1 for corrosion resistance and cryogenic-to-1500 °F service, Class 2 strain hardened to 125 ksi for strength.

TENSILE	75 ksi min	HEAT TREATMENT	Carbide solution treated
YIELD	30 ksi min	COMPANION NUT	ASTM A194 8
HARDNESS	223 HBW / 96 HRB max	TYPICAL SERVICE	-425 °F to 1500 °F

Nominal composition



■ Fe balance ~ 69.9% ■ Cr ~ 19.00% ■ Ni ~ 9.50% ■ Mn ~ 1.00% ■ Si ~ 0.50% ■ C, P, S trace

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

Chemical composition — ASTM A193 B8 (AISI 304, UNS S30400)

Element	Symbol	Min %	Max %
Carbon	C	—	0.08
Manganese	Mn	—	2.00
Phosphorus	P	—	0.045
Sulfur	S	—	0.030
Silicon	Si	—	1.00
Chromium	Cr	18.0	20.0
Nickel	Ni	8.0	11.0

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	0.289 lb/in ³ (8.00 g/cm ³)
MODULUS OF ELASTICITY	28.0 × 10 ⁶ psi (193 GPa)
THERMAL EXPANSION (68–212 °F)	9.6 µin/in·°F
MAGNETIC	No in the annealed condition; slightly magnetic after cold work

Heat treatment

Class 1: carbide solution treated. Class 1A (B8A): solution treated in the finished condition, 192 HBW / 90 HRB max.

Class 2: solution treated then strain hardened, to 1½ in. Class 2B: strain hardened to lower strength levels in three size steps, 2 in. and under, over 2 to 2½ in., and over 2½ to 3 in.

Mechanical properties — ASTM A193 B8 Class 1 and Class 1A (B8A)

Nominal diameter (in.)	Tensile strength, min (ksi)	Yield strength 0.2% offset, min (ksi)	Elongation in 4D, min (%)	Reduction of area, min (%)	Hardness, max
Class 1 — all diameters	75	30	30	50	223 HBW / 96 HRB
Class 1A (B8A) — all diameters	75	30	30	50	192 HBW / 90 HRB

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. Class 1 sizes ¾ in. and smaller may be 241 HBW / 100 HRB. Strain-hardened Class 2 and 2B properties are on the B8 Class 2 page.

Applicable standards

ASTM A193 / ASME SA-193	Alloy-steel and stainless steel bolting for high-temperature or high-pressure service
ASTM A320 GRADE B8	The same material specified for low-temperature service
ASTM A194 GRADE 8	Companion 304 stainless nuts
ASTM F593	Stainless steel bolts, hex cap screws and studs (commercial)
ASTM A276 / A479	304 and 304L bar stock

Forms we supply in A193 B8 Class 1

- 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

- Water treatment and waterworks flanges
- Food, beverage and pharmaceutical process equipment
- Cryogenic and LNG piping (Class 1)
- Architectural and marine-atmosphere hardware
- Chemical process piping in mild media
- Heat exchangers and stainless vessels