

ASTM A193 Grade B8 Class 2 (304 Strain Hardened) — Material Data Sheet

ASTM A193 / ASME SA-193 · UNS S30400 · AISI 304, solution treated and strain hardened

Austenitic 18-8 stainless steel, cold worked for strength

304 stainless bolting cold worked after solution treatment — 125 ksi tensile in ¾ in. and under, with strength stepping down by diameter to 1½ in.

TENSILE (<=¾ IN.)	125 ksi min	CONDITION	Solution treated + strain hardened
YIELD (<=¾ IN.)	100 ksi min	COMPANION NUT	ASTM A194 8
HARDNESS	321 HBW / 35 HRC max	MARKING	B8SH

Nominal composition



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

Chemical composition — ASTM A193 B8 Class 2 (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

Carbide solution treated, then strain hardened by cold reduction of the bar before machining. Class 2B is strain hardened to lower strength levels in three size steps from 2 in. and under to 3 in. Threads are normally rolled or cut after strain hardening; full-size testing of headed Class 2 components after strain hardening is permitted by the specification.

Mechanical properties — ASTM A193 B8 Class 2 and Class 2B

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 2 — ¾ and under	125	100	12	35	321 HBW / 35 HRC
Class 2 — over ¾ to 1	115	80	15	35	321 HBW / 35 HRC
Class 2 — over 1 to 1¼	105	65	20	35	321 HBW / 35 HRC
Class 2 — over 1¼ to 1½	100	50	28	45	321 HBW / 35 HRC
Class 2B — 2 and under	95	75	25	40	321 HBW / 35 HRC
Class 2B — over 2 to 2½	90	65	30	40	321 HBW / 35 HRC
Class 2B — over 2½ to 3	80	55	30	40	321 HBW / 35 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. Class 2 is limited to 1½ in. and Class 2B to 3 in. Strain-hardened austenitic steel may not show uniform properties through the section, particularly over ¾ in. diameter.

Applicable standards

ASTM A193 / ASME SA-193	Alloy-steel and stainless steel bolting for high-temperature or high-pressure service
ASTM A320 GRADE B8 CLASS 2	The same strain-hardened material for low-temperature service
ASTM A194 GRADE 8	Companion 304 stainless nuts
ASTM A276 / A479	304 bar stock

Forms we supply in A193 B8 Class 2

- 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

- Stainless flanged joints needing near-B7 bolt strength
- Pump, valve and compressor bolting in wet or corrosive service
- Water and wastewater plant with high bolt loads
- Food and pharmaceutical equipment with hydraulic loads
- Marine-atmosphere structural fasteners
- Heat exchanger and vessel bolting to moderate temperature