

ASTM A193 Grade B8M Class 2 (316 Strain Hardened) — Material Data

Sheet

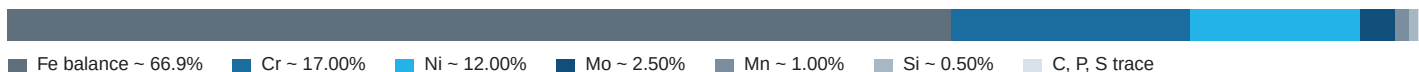
ASTM A193 / ASME SA-193 · UNS S31600 · AISI 316, solution treated and strain hardened

Austenitic molybdenum-bearing stainless steel, cold worked for strength

316 stainless bolting cold worked after solution treatment — 110 ksi tensile in $\frac{3}{4}$ in. and under, with B8M2 and B8M3 classes for diameters to 3 in. and beyond.

TENSILE ($\leq \frac{3}{4}$ IN.)	110 ksi min	CONDITION	Solution treated + strain hardened
YIELD ($\leq \frac{3}{4}$ IN.)	95 ksi min	COMPANION NUT	ASTM A194 8M
HARDNESS	321 HBW / 35 HRC max	MARKING	B8MSH (B8M2, B8M3)

Nominal composition



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

Chemical composition — ASTM A193 B8M Class 2 (AISI 316, UNS S31600)

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	16.0	18.0
Nickel	Ni	10.0	14.0
Molybdenum	Mo	2.00	3.00

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)	8.9 μ in/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 (B8M2) and Class 2C (B8M3) are strain hardened to lower strength levels so that large diameters keep usable ductility. Full-size testing of headed Class 2 components after strain hardening is permitted by the specification.

Mechanical properties — ASTM A193 B8M Class 2, 2B (B8M2) and 2C (B8M3)

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 — $\frac{3}{4}$ and under	110	95	15	45	321 HBW / 35 HRC
Class 2 — over $\frac{3}{4}$ to 1	100	80	20	45	321 HBW / 35 HRC
Class 2 — over 1 to 1 $\frac{1}{4}$	95	65	25	45	321 HBW / 35 HRC
Class 2 — over 1 $\frac{1}{4}$ to 1 $\frac{1}{2}$	90	50	30	45	321 HBW / 35 HRC
Class 2B (B8M2) — 2 and under	95	75	25	40	321 HBW / 35 HRC
Class 2B (B8M2) — over 2 to 2 $\frac{1}{2}$	90	65	30	40	321 HBW / 35 HRC
Class 2B (B8M2) — over 2 $\frac{1}{2}$ to 3	80	55	30	40	321 HBW / 35 HRC
Class 2C (B8M3) — 2 and under	85	65	30	60	321 HBW / 35 HRC
Class 2C (B8M3) — over 2	85	60	30	60	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 1 $\frac{1}{2}$ in.; Class 2B is listed in size steps to 3 in. and Class 2C for 2 in. and under and over 2 in. Strain-hardened austenitic steel may not show uniform properties through the section, particularly over $\frac{3}{4}$ 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 B8M CLASS 2	The same strain-hardened material for low-temperature service
ASTM A194 GRADE 8M	Companion 316 stainless nuts
ASTM A276 / A479	316 bar stock

Forms we supply in A193 B8M 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

- Offshore platform and subsea flange bolting
- Seawater cooling and desalination piping
- Chemical process units with chlorides
- Coastal refinery and terminal piping
- Pulp and paper bleach plant
- Pharmaceutical and food equipment with high bolt loads