

ASTM A194 Grade 8M (316 Stainless) — Material Data Sheet

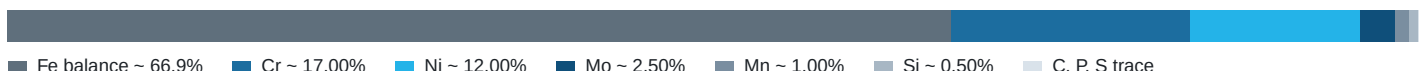
ASTM A194 / ASME SA-194 · UNS S31600 · AISI 316

Austenitic molybdenum-bearing stainless steel nut, forged or machined from bar (A type solution treated after finishing)

316 stainless heavy hex nut for B8M studs — molybdenum-bearing for chloride and marine service, 80 ksi proof load.

PROOF LOAD STRESS	80 ksi heavy hex · 75 ksi hex	PATTERN	Heavy hex (ASME B18.2.2)
HARDNESS	126–300 HBW	COMPANION STUD	ASTM A193 / A320 B8M
HEAT TREATMENT	None required; 8MA type is solution treated after finishing	TYPICAL SERVICE	-425 °F to 1500 °F

Nominal composition



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

Chemical composition — ASTM A194 Grade 8M (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 A194/A194M-24, Tables 1, 2 and 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.290 lb/in ³ (8.03 g/cm ³)
MODULUS OF ELASTICITY	28.0 × 10 ⁶ psi (193 GPa)
THERMAL EXPANSION (68–212 °F)	8.9 µin/in·°F
MAGNETIC	No in the annealed condition; slightly magnetic after cold work

Heat treatment

Grade 8M nuts are hot or cold forged, or machined from hot-forged, hot-rolled or cold-drawn bar, with no heat-treatment requirement (A194 clause 6.6). The 8MA type is carbide solution treated after forging or machining (clause 6.7), which lowers hardness to the 126–192 HBW / 60–90 HRB window.

Mechanical properties — ASTM A194 Grade 8M

Nut style and size (in.)	Proof load stress (ksi)	Hardness, min	Hardness, max
Heavy hex, all sizes	80	126 HBW / 60 HRB	300 HBW / 32 HRC
Hex (finished pattern), all sizes	75	126 HBW / 60 HRB	300 HBW / 32 HRC
Grade 8MA (solution treated in the finished condition), all sizes	80 heavy hex · 75 hex	126 HBW / 60 HRB	192 HBW / 90 HRB

Values per ASTM A194/A194M-24, Tables 1, 2 and 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Jam nuts: 46 % of the tabulated proof load. Strain-hardened Grade 8 nuts (S1) are proof tested to 125 / 115 / 105 / 100 ksi heavy hex by size and hardness limits do not apply.

Applicable standards

ASTM A194 / ASME SA-194	Nuts for bolts for high-pressure or high-temperature service
ASTM A193 / A320 GRADE B8M	Companion studs
ASME B18.2.2	Heavy hex nut dimensions
NACE MR0175 / ISO 15156	316 is listed for sour service within its limits

Forms we supply in A194 8M

- Heavy hex nuts (the default for pressure bolting)
- Finished hex nuts
- Jam nuts
- Custom and special nuts to drawing

Typical applications

- Offshore and marine flange bolting
- Seawater and desalination piping
- Chemical and pharmaceutical process equipment
- Coastal plant and pulp-mill bolting
- Sour service within NACE limits