

ASTM A194 Grade 16 — Material Data Sheet

ASTM A194 / ASME SA-194 · UNS K14072 · Cr-Mo-V alloy steel
Chromium-molybdenum-vanadium alloy steel nut, quenched and tempered

The Cr-Mo-V heavy hex nut that matches A193 B16 studs — for steam turbine and high-temperature steam flange bolting.

PROOF LOAD STRESS	175 ksi heavy hex · 150 ksi hex	PATTERN	Heavy hex (ASME B18.2.2)
HARDNESS	248–327 HBW / 24–35 HRC	COMPANION STUD	ASTM A193 B16
HEAT TREATMENT	Q&T, 1200 °F min temper	TYPICAL SERVICE	Up to 1100 °F

Nominal composition

■ Fe balance ~ 96.8% ■ Cr ~ 0.97% ■ Mn ~ 0.57% ■ Mo ~ 0.57% ■ C, P, S, Si, V, Al trace

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

Chemical composition — ASTM A194 Grade 16 (Cr-Mo-V, UNS K14072)

Element	Symbol	Min %	Max %
Carbon	C	0.36	0.47
Manganese	Mn	0.45	0.70
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.15	0.35
Chromium	Cr	0.80	1.15
Molybdenum	Mo	0.50	0.65
Vanadium	V	0.25	0.35
Aluminum (total)	Al	—	0.15

Values per ASTM A194/A194M-24, Tables 1, 2 and 5 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.7 × 10 ⁶ psi (205 GPa)
MAGNETIC	Yes (ferromagnetic)

Heat treatment

Heated to 1700–1750 °F (925–955 °C), oil quenched and tempered at 1200 °F (650 °C) minimum.

Mechanical properties — ASTM A194 Grade 16

Nut style and size (in.)	Proof load stress (ksi)	Hardness, min	Hardness, max
Heavy hex, all sizes	175	248 HBW / 24 HRC	327 HBW / 35 HRC
Hex (finished pattern), all sizes	150	248 HBW / 24 HRC	327 HBW / 35 HRC

Values per ASTM A194/A194M-24, Tables 1, 2 and 5 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A194 / ASME SA-194	Nuts for bolts for high-pressure or high-temperature service
ASTM A193 GRADE B16	Companion studs
ASME B18.2.2	Heavy hex nut dimensions
ASME B31.1	Power piping

Forms we supply in A194 16

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

Typical applications

- Steam turbine casing and horizontal joint bolting
- HP and HT steam flanges
- Boiler and superheater valve bonnets
- Combined-cycle plant bolting