

ASTM A194 Grade 8R (Nitronic 50 / XM-19) — Material Data Sheet

ASTM A194 / ASME SA-194 · UNS S20910 · XM-19 (Nitronic® 50)

Nitrogen-strengthened austenitic stainless nut, forged or machined from bar (A type solution treated after finishing)

Nitronic 50 heavy hex nut for B8R studs — high-strength, non-magnetic and seawater resistant; 80 ksi proof load.

PROOF LOAD STRESS	80 ksi heavy hex · 75 ksi hex	PATTERN	Heavy hex (ASME B18.2.2)
HARDNESS	183–271 HBW / 88 HRB–25 HRC	COMPANION STUD	ASTM A193 B8R
HEAT TREATMENT	None required; 8RA type is solution treated after finishing	MAGNETIC	No, even after cold work

Nominal composition



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

Chemical composition — ASTM A194 Grade 8R (XM-19 / Nitronic 50, UNS S20910)

Element	Symbol	Min %	Max %
Carbon	C	—	0.06
Manganese	Mn	4.0	6.0
Phosphorus	P	—	0.045
Sulfur	S	—	0.030
Silicon	Si	—	1.00
Chromium	Cr	20.5	23.5
Nickel	Ni	11.5	13.5
Molybdenum	Mo	1.50	3.00
Nitrogen	N	0.20	0.40
Niobium (columbium)	Nb	0.10	0.30
Vanadium	V	0.10	0.30

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	0.285 lb/in ³ (7.88 g/cm ³)
MODULUS OF ELASTICITY	28.5 × 10 ⁶ psi (196 GPa)
MAGNETIC	No — remains non-magnetic after cold work

Heat treatment

Grade 8R 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 8RA type is carbide solution treated after forging or machining (clause 6.7), which lowers hardness to the 126–192 HBW / 60–90 HRB window for the 8RA / 8SA types with their own hardness window.

Mechanical properties — ASTM A194 Grade 8R

Nut style and size (in.)	Proof load stress (ksi)	Hardness, min	Hardness, max
Heavy hex, all sizes	80	183 HBW / 88 HRB	271 HBW / 25 HRC
Hex (finished pattern), all sizes	75	183 HBW / 88 HRB	271 HBW / 25 HRC
Grade 8RA (solution treated in the finished condition), all sizes	80 heavy hex · 75 hex	183 HBW / 88 HRB	271 HBW / 25 HRC

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.

Applicable standards

ASTM A194 / ASME SA-194	Nuts for bolts for high-pressure or high-temperature service
ASTM A193 GRADE B8R	Companion studs
ASME B18.2.2	Heavy hex nut dimensions

Forms we supply in A194 8R

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

Typical applications

- Naval and marine bolting with B8R
- Seawater pumps, valves and desalination
- Sour and chloride process service
- Non-magnetic hardware