

Nitronic 50® Stainless Steel (UNS S20910, XM-19) — Material Data Sheet

ASTM A276 bar · ASTM A193 B8R bolts · UNS S20910 · AISI XM-19

Nitrogen-strengthened austenitic stainless steel with Mo, Nb and V

Nearly twice the yield strength of 316 with better corrosion resistance, non-magnetic even after cold work — the marine and sour-service austenitic for shafts, valves and high-strength bolting.

TENSILE, ANNEALED BAR	100 ksi min	NITROGEN	0.20–0.40 %
YIELD, ANNEALED BAR	55 ksi min	MAGNETIC	No, even after cold work
TENSILE, HIGH STRENGTH (≤2 IN.)	135 ksi min	PRESSURE-FLANGE GRADE	ASTM A193 B8R

Nominal composition



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

Chemical composition — Type XM-19 (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	Nb	0.10	0.30
Vanadium	V	0.10	0.30

Physical properties (typical)

DENSITY	0.285 lb/in ³ (7.88 g/cm ³)
MODULUS OF ELASTICITY	28.5 × 10 ⁶ psi (196 GPa)
THERMAL EXPANSION (68–212 °F)	9.0 µin/in·°F
MAGNETIC PERMEABILITY	Below 1.01 after cold work

Heat treatment

Solution annealed at about 1950 to 2050 °F and quenched for Condition A. The high-strength condition is produced by controlled hot working without a final anneal. Not hardenable by heat treatment.

Values per ASTM A276/A276M-17 Tables 1 and 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Bar properties — ASTM A276 Type XM-19

Condition and nominal diameter (in.)	Tensile strength, min (ksi)	Yield strength 0.2% offset, min (ksi)	Elongation, min (%)	Reduction of area, min (%)	Hardness
Condition A (annealed) — all	100	55	35	55	—
As hot rolled (high strength) — 2 and under	135	105	20	50	—
As hot rolled — over 2 to 3	115	75	25	50	—
As hot rolled — over 3 to 8	100	60	30	50	—

Values per ASTM A276/A276M-17 Tables 1 and 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM A276 / A479	Stainless steel bars (XM-19)
ASTM A193 GRADE B8R	Bolting for high-temperature or high-pressure service
ASTM A194 GRADE 8R	Companion nuts
NACE MR0175 / ISO 15156	Listed for sour service within its hardness limits

Forms we supply in Nitronic 50

- Hex and heavy hex bolts and cap screws
- Full-thread studs and threaded rod
- Socket head cap and set screws
- Hex, jam and lock nuts
- Washers and spacers
- Machined components from certified bar

Typical applications

- Marine shafting, propulsion and rudder hardware
- Seawater pumps, valves and desalination equipment
- Sour and chloride process service
- Non-magnetic and MRI-adjacent hardware
- Nuclear and power plant components
- High-strength fasteners where 316 is too weak