

Inconel 625 (UNS N06625) — Material Data Sheet

ASTM B446 bar · ASTM F468 / F467 fasteners · UNS N06625 · Inconel® alloy 625 (Ni-Cr-Mo-Nb)

Solid-solution nickel-chromium-molybdenum-niobium alloy, annealed or solution annealed

The corrosion all-rounder — 120 ksi in the annealed condition, resistant to seawater, sour gas, acids and oxidation to 1800 °F, and the F468 nickel fastener grade Ni 625.

TENSILE, B446 GRADE 1 (≤4 IN.)	120 ksi min	NUT PROOF STRESS, F467	60 ksi (Gr 1) · 120 ksi (Gr 2)
YIELD, B446 GRADE 1 (≤4 IN.)	60 ksi min	MAX SERVICE TEMPERATURE	About 1800 °F
F468 FASTENER	120 ksi tensile · 60 ksi yield	MAGNETIC	No

Nominal composition



■ Ni balance ~ 61.9% ■ Cr ~ 21.50% ■ Mo ~ 9.00% ■ Nb+Ta ~ 3.65% ■ Fe ~ 2.50% ■ Co ~ 0.50% ■ Al, Ti, C, Mn, Si, P, S trace

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

Chemical composition — Inconel 625 (N06625) per ASTM B446 Table 2

Element	Symbol	Min %	Max %
Nickel	Ni	58.0	—
Chromium	Cr	20.0	23.0
Molybdenum	Mo	8.0	10.0
Niobium + tantalum	Nb+Ta	3.15	4.15
Iron	Fe	—	5.0
Cobalt	Co	—	1.0
Aluminum	Al	—	0.40
Titanium	Ti	—	0.40
Carbon	C	—	0.10
Manganese	Mn	—	0.50
Silicon	Si	—	0.50
Phosphorus	P	—	0.015
Sulfur	S	—	0.015

Values per ASTM B446-19 Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.305 lb/in ³ (8.44 g/cm ³)
MODULUS OF ELASTICITY	30.1 × 10 ⁶ psi (208 GPa)
MELTING RANGE	2350–2460 °F
MAGNETIC	No

Heat treatment

Not age hardenable. Grade 1 annealed for strength below 1100 °F; Grade 2 solution annealed for creep resistance above 1100 °F.

Bar properties — Inconel 625 rod and bar per ASTM B446 Table 1

Condition and size	Tensile strength, min (ksi)	Yield strength 0.2%, min (ksi)	Elongation, min (%)
Grade 1 (annealed) — up to 4 in.	120	60	30
Grade 1 (annealed) — over 4 to 10 in.	110	50	25
Grade 2 (solution annealed) — all sizes	100	40	30

Values per ASTM B446-19 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Grade 1 annealed at 1600 °F minimum; Grade 2 solution annealed at 2000 °F minimum (an 1800 °F stabilizing anneal is optional), the grade normally chosen for service above about 1100 °F.

Fastener mechanical properties per ASTM F468 Table 2 (marking F468AC)

Nominal diameter (in.)	Hardness	Full-size tensile (ksi)	Full-size yield, min (ksi)	Machined tensile, min (ksi)	Machined yield, min (ksi)	Elongation in 4D, min (%)
All sizes	85 HRB – 35 HRC	120 min	60	120	60	30

Values per ASTM F468-23 Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Full-size tensile range and yield; machined-specimen minimums in the last three columns.

Nut requirements per ASTM F467 Table 2 (marking F467AC (Grade 1) · F467AD (Grade 2))

Nut style	Hardness, min	Proof stress, min (ksi)
Hex and hex flange	85 HRB – 35 HRC	60 (Gr 1) · 120 (Gr 2)
Heavy hex, large hex flange and thick	85 HRB – 35 HRC	65 (Gr 1) · 130 (Gr 2)

Values per ASTM F467-24 Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM B446	Nickel-chromium-molybdenum-columbium alloy rod and bar
ASTM F468 / F467	Nonferrous bolts and nuts (Ni 625, F468AC / F467AC, F467AD)
ASME SB-446	Boiler and Pressure Vessel Code equivalent
NACE MR0175 / ISO 15156	Alloy 625 for sour service
AMS 5666	Aerospace alloy 625 bar

Forms we supply in Inconel 625

- Full-thread studs and stud bolts
- Hex and heavy hex bolts
- Socket head cap screws
- Hex nuts in the same alloy
- Threaded rod
- Machined components from certified bar

Typical applications

- Seawater and offshore fasteners and components
- Sour gas wellhead and downhole hardware
- Chemical process equipment in mixed acids
- Aerospace and gas-turbine ducting and fasteners
- Flue-gas scrubbers and pollution control
- Nuclear and cryogenic hardware