

Monel 400 (UNS N04400) — Material Data Sheet

ASTM F468 / F467 fasteners · ASTM B164 bar · UNS N04400 · Monel® 400 (Ni-Cu alloy 400)

Solid-solution nickel-copper alloy, hot or cold worked

The nickel-copper alloy that shrugs off seawater, brine and hydrofluoric acid — the classic marine and chemical fastener material, non-sparking and tough to cryogenic temperatures.

TENSILE, F468 ($\leq \frac{3}{4}$ IN.)	80 ksi min	NUT PROOF STRESS, F467	80 ksi hex · 86 heavy hex
YIELD, F468 ($\leq \frac{3}{4}$ IN.)	40 ksi min	CONDITION	Cold worked, stress relieved
HARDNESS, F468	75 HRB – 25 HRC	MAGNETIC	Slightly (Curie point near room temperature)

Nominal composition



■ Cu balance ~ 30.8% ■ Ni ~ 66.50% ■ Fe ~ 1.25% ■ Mn ~ 1.00% ■ C, Si, S trace

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

Chemical composition — Monel 400 (N04400) per ASTM B164 Table 3 and F468 Table 2 Physical properties (typical)

Element	Symbol	Min %	Max %
Nickel	Ni	63.0	70.0
Copper	Cu	28.0	34.0
Iron	Fe	—	2.5
Manganese	Mn	—	2.0
Carbon	C	—	0.3
Silicon	Si	—	0.5
Sulfur	S	—	0.024

DENSITY	0.319 lb/in ³ (8.83 g/cm ³)
MODULUS OF ELASTICITY	26.0×10^6 psi (179 GPa)
MELTING RANGE	2370–2460 °F
MAGNETIC	Weakly, depending on composition and temperature

Heat treatment

Not hardenable by heat treatment. Supplied cold worked and stress relieved, hot worked, or annealed as ordered; stress relief after cold working removes susceptibility to stress cracking in mercury and some other media.

Values per ASTM B164-03(2019) Table 3 and ASTM F468-23 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. Nickel is determined by difference; F468 lists copper as the balance.

Fastener mechanical properties — Monel 400 per ASTM F468 Table 2 (Ni 400, marking F468U)

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 (%)
0.250 to 0.750	75 HRB – 25 HRC	80–130	40	80	40	20
0.875 to 1.500	60 HRB – 25 HRC	70–130	30	70	30	20
0.875 to 1.500 (F468U4, high strength)	75 HRB – 25 HRC	80–130	40	80	40	20

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 — Monel 400 per ASTM F467 Table 2 (marking F467U)

Nut style	Hardness, min	Proof stress, min (ksi)
Hex and hex flange	75 HRB	80
Heavy hex, large hex flange and thick	75 HRB	86

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

Bar properties — Monel 400 rod and bar per ASTM B164 Table 1

Condition and size	Tensile strength, min (ksi)	Yield strength 0.2%, min (ksi)	Elongation, min (%)
Cold worked, stress relieved — rounds ½ to 3½ in.	87	60	20
Cold worked, stress relieved — rounds under ½ in.	84	50	10
Hot worked, as worked or stress relieved — to 12 in.	80	40	30
Annealed — all sizes	70	25	35

Values per ASTM B164-03(2019) Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM F468 / F468M	Nonferrous bolts, hex cap screws, socket head cap screws and studs (Ni 400, F468U)
ASTM F467 / F467M	Nonferrous nuts (Ni 400, F467U)
ASTM B164	Nickel-copper alloy rod, bar and wire
QQ-N-281 / MIL-DTL-24106	Military Monel bar and forgings
NACE MR0175 / ISO 15156	Alloy 400 for sour service within its limits

Forms we supply in Monel 400

- Studs, hex bolts and cap screws to F468
- Hex and heavy hex nuts to F467
- Socket head cap and set screws
- Pump, valve and marine components machined to print
- Certified B164 bar, cold drawn or hot finished

Typical applications

- Seawater pumps, valves and propeller hardware
- Hydrofluoric acid and fluoride process equipment
- Salt production and brine handling
- Chemical and petroleum refining (sulfuric acid, caustic)
- Cryogenic and LNG equipment
- Non-sparking tooling and mining hardware