

Inconel 718 (UNS N07718) — Material Data Sheet

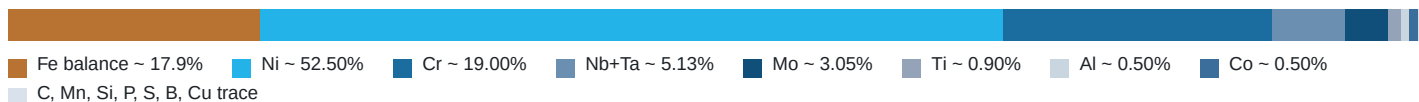
ASTM B637 bar · AMS 5662 / 5663 · API 6A CRA · UNS N07718 · Inconel® alloy 718 (Ni-Cr-Nb-Mo)

Precipitation-hardenable nickel-chromium superalloy, solution treated and double aged

The premier high-strength nickel superalloy — 185 ksi tensile and 150 ksi yield from cryogenic temperatures to 1200 °F, with corrosion and sour-gas resistance to match.

TENSILE	185 ksi min	STRESS RUPTURE	100 ksi at 1200 °F, 23 h min
YIELD	150 ksi min	HEAT TREATMENT	Solution 1700–1850 °F + double age
HARDNESS	331 HBW min (about 36 HRC)	MAGNETIC	No

Nominal composition



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

Chemical composition — Inconel 718 (N07718) per ASTM B637 Table 1

Element	Symbol	Min %	Max %
Nickel	Ni	50.0	55.0
Chromium	Cr	17.0	21.0
Niobium + tantalum	Nb+Ta	4.75	5.50
Molybdenum	Mo	2.80	3.30
Titanium	Ti	0.65	1.15
Aluminum	Al	0.20	0.80
Cobalt	Co	—	1.0
Carbon	C	—	0.08
Manganese	Mn	—	0.35
Silicon	Si	—	0.35
Phosphorus	P	—	0.015
Sulfur	S	—	0.015
Boron	B	—	0.006
Copper	Cu	—	0.30
Iron	Fe	balance	—

Values per ASTM B637-16 Table 1 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Physical properties (typical)

DENSITY	0.297 lb/in ³ (8.19 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
MELTING RANGE	2300–2435 °F
MAGNETIC	No

Heat treatment

Solution treated at 1700–1850 °F and double aged (1325 °F for 8 h, furnace cool to 1150 °F, 18 h total). Machined and threaded before ageing so the finished thread carries full properties.

Mechanical properties — Inconel 718 per ASTM B637 Table 3, solution treated and precipitation hardened

Condition	Tensile strength, min (ksi)	Yield strength 0.2%, min (ksi)	Elongation, min (%)	Reduction of area, min (%)	Hardness, min
Solution + precipitation hardened	185	150	12	15	331 HBW

Values per ASTM B637-16 Table 3 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team. The reduced 6 % elongation and 8 % reduction of area apply only to specimens taken tangentially near the centre of disk forgings over 50 in.² in section, or radially from rings 3 in. or more thick (Table 3 footnote E).

Stress-rupture requirement — Inconel 718 per ASTM B637 Table 4

Test temperature	Stress (ksi)	Time to rupture, min (h)	Elongation, min (%)
1200 °F (649 °C)	100	23	5

Values per ASTM B637-16 Table 4 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Heat treatment — Inconel 718 per ASTM B637 Table 2

Step	Cycle
Solution treatment	1700–1850 °F (924–1010 °C), hold ½ h minimum, cool at a rate equivalent to air cool or faster
Precipitation hardening	1325 ± 25 °F (718 °C), hold 8 h, furnace cool to 1150 ± 25 °F (621 °C), hold until total time reaches 18 h, air cool

Values per ASTM B637-16 Table 2 (verified against the specification). Confirm the edition called out on your purchase order with our estimating team.

Applicable standards

ASTM B637	Precipitation-hardening and cold-worked nickel alloy bars, forgings and forging stock for moderate or high temperature service
AMS 5662 / 5663 / 5664	Aerospace 718 bar and forgings
API 6A / 6ACRA	Wellhead and tree equipment in corrosion-resistant alloys (718 bolting and components)
NACE MR0175 / ISO 15156	Alloy 718 for sour service within its hardness limits (typically 40 HRC max)
ASME SB-637	Boiler and Pressure Vessel Code equivalent

Forms we supply in Inconel 718

- Studs, hex and 12-point bolts, cap screws
- Hex and heavy hex nuts in the same alloy
- Wellhead, tree and subsea components machined to print
- Turbine and exhaust hardware
- Certified B637 / AMS bar, solution treated or aged

Typical applications

- Gas turbine casings, discs and fasteners
- Wellhead, Christmas-tree and subsea bolting (API 6A CRA)
- Sour gas and high-pressure high-temperature wells
- Cryogenic and rocket-engine hardware
- Nuclear and power-generation components
- High-strength fasteners for aerospace and defence