

INCONEL® 718

UNS N07718 · W.Nr. 2.4668

Age-hardenable Ni–Cr–Fe–Nb alloy

Exceptional tensile, fatigue, creep and rupture strength from cryogenic temperatures to about 704°C.

01 PRODUCT INTRODUCTION

An age-hardenable nickel-chromium alloy combining high strength, corrosion resistance and outstanding resistance to post-weld cracking. Niobium, titanium and aluminum form strengthening precipitates during controlled solution and aging treatments. The final engineering choice should also consider product form, heat-treatment condition, joining method, design temperature, loading mode and the governing ASTM, AMS or ASME requirement.

02 ENGINEERING POSITION

Core advantage	High-strength service, fatigue, creep and rupture loading from –253°C to about 704°C
Applications	Aircraft and land-based gas turbines · rocket components · cryogenic tanks · fasteners · high-strength oil and gas parts
Material class	Age-hardenable Ni–Cr–Fe–Nb alloy

SELECTION NOTE Confirm product form, heat treatment, design code, temperature and actual process chemistry before final specification.

03 SOURCE BASIS

Primary source	Special Metals INCONEL® alloy 718 technical bulletin
Identity	UNS N07718 · W.Nr. 2.4668

Composition & Physical Data

Official limiting composition and typical physical constants.

04 CHEMICAL COMPOSITION

WEIGHT %

Ni + Co	50.0–55.0%	Cr	17.0–21.0%
Fe	Balance	Nb + Ta	4.75–5.50%
Mo	2.80–3.30%	Ti	0.65–1.15%
Al	0.20–0.80%	C	≤ 0.08%

SOURCE CONTROL

Composition values are taken from the official Special Metals technical bulletin; use the governing ASTM/AMS specification for purchase acceptance.

05 TYPICAL PHYSICAL PROPERTIES

ROOM TEMPERATURE

Density	8.19–8.22 g/cm³	Melting range	1260–1336°C
Specific heat	435 J/kg·°C at 21°C	Magnetism	Low permeability
Condition	Annealed / treated	Data status	Typical, not acceptance

06 MATERIAL IDENTITY

Common name	INCONEL® alloy 718
UNS / W.Nr.	N07718 / 2.4668
Alloy family	Age-hardenable Ni–Cr–Fe–Nb alloy
Product data	ASTM B637 · B670 · AMS 5662/5663 · AMS 5596 · AMS 5589

ACCEPTANCE RULE

Chemical and physical reference data do not replace the certified material test report or purchase specification.

Mechanical & Service Performance

Condition-dependent performance and service-selection guidance.

07 MECHANICAL PROPERTIES

Common aged specifications require very high room-temperature strength; exact minimum tensile, yield and elongation values depend on AMS/ASTM product form and heat-treatment route.

08 SERVICE PERFORMANCE

Primary service	High-strength service, fatigue, creep and rupture loading from –253°C to about 704°C
Corrosion basis	Nickel supports corrosion resistance; chromium supports oxidation; Mo/Nb/Al contributions depend on grade.
Temperature	Use grade-specific code allowables, creep data and heat-treatment condition.
Welded service	Review filler metal, heat input, post-weld condition and service environment.

09 TYPICAL APPLICATIONS

Industries	Aircraft and land-based gas turbines · rocket components · cryogenic tanks · fasteners · high-strength oil and gas parts
Critical review	Verify chloride SCC, oxidation, carburization, sulfidation, fatigue and creep as relevant.

IMPORTANT

Official bulletin values are representative. Critical service requires code compliance, certified material data and, where appropriate, corrosion or qualification testing.

Fabrication, Welding & Heat Treatment

Process controls needed to preserve the intended alloy condition.

10 FORMING & MACHINING

Cold forming	Use nickel-alloy tooling practice and account for work hardening.
Hot working	Use the grade-specific hot-working window from the applicable technical bulletin.
Machining	Rigid setup, sharp tooling, positive feed and adequate coolant are recommended.

11 WELDING GUIDANCE

Processes	GTAW, GMAW and SMAW may be used with qualified procedures.
Filler metal	Select the matching grade-specific filler and verify service compatibility.
Heat input	Control interpass temperature, dilution and unnecessary reheating.
Cleanliness	Remove oil, grease, oxides and iron contamination before welding.

12 HEAT TREATMENT

Official routes include solution treatment at 927–1010°C followed by staged aging, or 1038–1066°C solution treatment followed by a higher-temperature aging cycle.

QUALITY CONTROL Confirm WPS/PQR, heat-treatment records, NDE, surface cleaning and full heat-number traceability.

Product Forms, Standards & Procurement

A practical specification and quotation checklist.

13 REFERENCE STANDARDS

ASTM B637 · B670 · AMS 5662/5663 · AMS 5596 · AMS 5589

14 COMMON PRODUCT FORMS

Forms	Plate · sheet · strip · bar · wire · pipe · tube · fittings · forgings
Condition	Annealed, solution treated or age hardened as required by grade and specification

15 RFQ INFORMATION

Material	INCONEL® 718 · UNS N07718 · governing ASTM/AMS/ASME specification
Dimensions	Form, OD/ID, wall or thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, PMI, NDE and customer-specific tests
Documents	EN 10204 3.1 MTR, heat traceability and compliance certificates

16 TECHNICAL DISCLAIMER

Values shown are from the cited official technical bulletin or are clearly identified as condition-dependent guidance. They may vary by product form, thickness and heat treatment. The purchase specification, applicable design code and certified material test report control final acceptance.

Official source	Special Metals technical bulletin: INCONEL® alloy 718
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