Inconel 725 (UNS N07725) — Technical Data Sheet

Alloy 725 | Age-Hardenable Nickel-Chromium-Molybdenum-Niobium-Titanium Superalloy

ASTM B805 | API 6A / 17D | NACE MR0175 / ISO 15156 | EN 10204 3.1 | ISO 9001

Material Overview

Inconel 725, also known as **Alloy 725** and **UNS N07725**, is a nickel-chromium-molybdenum-niobium-titanium age-hardenable superalloy. It offers significantly higher strength than Alloy 625 while maintaining outstanding corrosion resistance, making it the best material for extreme service working conditions.

UNS Number	Common Name	DIN / Werkstoff Nr.	Density
N07725	Inconel 725 / Alloy 725	2.4659	8.31 g/cm³ (0.300 lb/in³)

Melting & Production Processes

We use advanced melting processes to ensure that Inconel 725 raw material has high purity, uniform microstructure, and consistent quality:

- VIM + VAR (Vacuum Induction Melting + Vacuum Arc Remelting)
- VIM + ESR (Vacuum Induction Melting + Electroslag Remelting)
- AOD + ESR / VAR

Chemical Composition (wt%)

Inconel 725 (UNS N07725) Chemical Composition (Weight Percentage)

C	Mn	Si	P	S	Cr	Mo	Nb+Ta	Ti	Al	Ni	Fe
≤0.03	≤0.35	≤0.20	≤0.015	≤0.010	19.5–22.5	7.0–9.5	2.75–4.0	1.0–1.7	≤0.35	55.0–59.0	Balance

Mechanical Properties of Age-Hardened Inconel 725 Forgings

Typical Mechanical Properties of Age-Hardened Inconel 725 Forgings (per ASTM B805)

Tensile Strength (psi)	Yield Strength (psi)	Elongation (%)	Reduction of Area (%)	Hardness	Charpy V-Notch (-75°F)
≥150,000	≥120,000	≥20	≥35	HRC 30–43	≥31 ft-lbs (avg)

Physical & Thermal Properties

Property	Value	Unit
Density	8.31	g/cm³
Melting Point (Liquidus)	1,335	°C
Melting Point (Solidus)	1,260	°C
Specific Heat (20°C)	427	J/(kg·K)

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Property	Value	Unit
Thermal Conductivity (20°C)	12.5	W/(m·K)
Thermal Conductivity (300°C)	16.0	W/(m·K)
Mean CTE (20–100°C)	12.8 × 10■■	K■¹
Mean CTE (20–500°C)	14.0 × 10■■	K■¹
Electrical Resistivity (RT)	1.27	μΩ·m
Magnetic Permeability	< 1.01	—
Modulus of Elasticity	≈ 207	GPa

Recommended Heat Treatment

Step	Temperature	Hold Time	Atmosphere	Cooling
Solution Anneal	1,038 – 1,066°C (1,900 – 1,950°F)	1 h per 25 mm (30 min minimum)	Air / Inert	Water quench or rapid air cool
Age — Stage 1	725°C (1,337°F)	8 hours	Air / Inert	Furnace cool to Stage 2 temperature
Age — Stage 2	620°C (1,148°F)	8 hours	Air / Inert	Air cool

Corrosion Resistance

Environment	Performance	Standard / Test
H■S / CO■ Sour Service	Excellent — NACE MR0175 / ISO 15156 compliant	ISO 15156-3
Chloride Stress Corrosion Cracking	Excellent (to boiling MgCl■)	ASTM G36
Pitting & Crevice Corrosion	Very Good (PREN > 40)	ASTM G48
Seawater (Stagnant & Flowing)	Excellent	—
Strong Mineral Acids	Good (depends on concentration)	ASTM G31
Alkaline Environments	Excellent	—
Oxidation (to 980°C)	Very Good	ASTM B558

Applicable Standards & Specifications

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Standard / Spec.	Description	Form
ASTM B805	Standard Specification for UNS N07725 Bars	Bar
ASTM B564	Nickel Alloy Forgings	Forging
API 6A / 17D	Wellhead & Christmas Tree / Subsea Equipment	All
NACE MR0175 / ISO 15156	SSC-Resistant Materials for Sour (H■S) Service	All
EN 10204 3.1 / 3.2	Material Test Certificate Requirements	All
NORSOK M-650	Qualification of Manufacturers of Special Materials	All
ISO 9001	Quality Management System Certification	All

Quality Assurance & Testing

All Inconel 725 forgings undergo strict inspection and testing before delivery to meet international standards or clients' technical requirements:

- 100% dimensional inspection and visual inspection
- Hardness testing and microstructure analysis
- Magnetic Particle (MT) or Liquid Penetrant (PT) non-destructive testing
- Ultrasonic (UT) or Radiographic (RT) non-destructive testing
- Full material test reports (MTR) with EN 10204 3.1 certification
- NACE MR0175 / ISO 15156 for sour service applications

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