

Nimonic 80A is a **precipitation-hardened nickel-chromium superalloy** known for its **excellent high-temperature strength, oxidation resistance, and creep resistance**. It is widely used in aerospace, gas turbines, and industrial heating applications.

Key Features:

- High tensile and creep strength at elevated temperatures (up to 815°C / 1500°F)
- Good corrosion and oxidation resistance
- Excellent fatigue resistance
- Suitable for forging, machining, and welding

Applications

Due to its superior high-temperature properties, Nimonic 80A is used in:

- **Aerospace:** Turbine blades, exhaust systems, combustion chambers
- **Power Generation:** Gas turbine components, bolts, fasteners
- **Industrial Furnaces:** Heat treatment fixtures, radiant tubes
- **Automotive:** Turbocharger components

Equivalent or Similar Grades - Chemical Composition

Element	Nimonic 80A (AMS 5542)	2.4631 (DIN/W-Nr)	UNS N07080	NCF 80A (JIS H4551)	NC20K14 (AFNOR)
Ni	Bal.	Bal.	Bal.	Bal.	Bal.
Cr	18.0 - 21.0	18.0 - 21.0	18.0 - 21.0	18.0 - 21.0	18.0 - 21.0
Ti	1.8 - 2.7	1.8 - 2.7	1.8 - 2.7	1.8 - 2.7	1.8 - 2.7
Al	0.5 - 1.8	0.5 - 1.8	0.5 - 1.8	0.5 - 1.8	0.5 - 1.8
Fe	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0
C	≤ 0.10	≤ 0.10	≤ 0.10	≤ 0.10	≤ 0.10
Mn	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0
Si	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0
Cu	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
S	≤ 0.015	≤ 0.015	≤ 0.015	≤ 0.015	≤ 0.015

Mechanical Properties

Room Temperature Properties (Solution Treated + Aged)

Property	Value
Tensile Strength	950 - 1200 MPa
Yield Strength (0.2%)	600 - 800 MPa
Elongation (%)	15 - 25%
Hardness (HRC)	28 - 35

High-Temperature Mechanical Properties

Temperature (°C)	Tensile Strength (MPa)	Yield Strength (MPa)
600	800 - 950	550 - 700
700	650 - 800	450 - 600
800	450 - 600	300 - 450

Creep & Rupture Strength

Temperature (°C)	Stress for 1000h Rupture (MPa)
700	300 - 400
800	150 - 250

Physical Properties

Property	Value
Density (g/cm³)	8.19
Melting Range (°C)	1320-1365
Thermal Conductivity (W/m·K)	11.7 (at 20°C)
Electrical Resistivity (μΩ·m)	1.25

Heat Treatment

Solution Treatment

- **1080°C (1975°F) for 4-8 hours, air cool**

Aging (Precipitation Hardening)

- 700-750°C (1290-1380°F) for 16-24 hours, air cool

Delivery Conditions

- Solution Annealed (Soft Condition for Machining)
- Solution Annealed + Aged (High-Strength Condition)

Processing Performance

- **Machining:** Difficult due to work hardening; carbide tools recommended.
- **Welding:** Weldable using TIG or resistance welding; post-weld heat treatment required.

Turbine Alloy