NIMONIC 80A

UNS N07080

Age-hardenable Ni–Cr–Ti–Al alloy

Creep-resistant alloy for turbine blades, fasteners and high-temperature springs.

01 PRODUCT INTRODUCTION

NIMONIC 80A is a wrought precipitation-hardenable nickel-chromium alloy strengthened by titanium and aluminum. After solution treatment and aging, gamma-prime precipitation provides useful tensile, fatigue, creep and rupture strength at elevated temperature. It is widely used for turbine blades, exhaust valves, fasteners and springs. Final properties depend strongly on product form, prior cold work and the prescribed heat-treatment cycle. Final selection should consider product form, heat treatment, atmosphere, design temperature, stress, thermal cycling and the governing aerospace specification.

02 ENGINEERING POSITION

Core advantage	Creep, rupture and fatigue strength at elevated temperature
Applications	Turbine blades · exhaust valves · high-temperature fasteners · springs · hot tooling
Material class	Age-hardenable Ni–Cr–Ti–Al alloy

03 COMMON INDUSTRY USE

Industry focus	Turbine blades · exhaust valves · high-temperature fasteners · springs · hot tooling
Design note	Use grade-specific creep, rupture, fatigue and heat-treatment data.

Composition & Physical Data

04 CHEMICAL COMPOSITION

Ni	≥ 65%	**Cr**	**18–21%**
Ti	1.8–2.7%	**Al**	**1.0–1.8%**
Fe	≤ 3%	**Co**	**≤ 2%**
C	≤ 0.10%	**B**	**≤ 0.008%**

05 PHYSICAL PROPERTIES

Density	8.19 g/cm³
Condition	Solution treated / aged by grade
Data status	Typical reference; specification controls acceptance

06 MATERIAL IDENTITY

Common name	NIMONIC 80A
UNS	N07080
Alloy family	Age-hardenable Ni–Cr–Ti–Al alloy
Source basis	Published alloy data and governing aerospace specifications

Mechanical & High-Temperature Performance

07 MECHANICAL PROPERTIES

Strength basis	Product form, grain structure, solution treatment and aging determine properties.
Design data	Use specification minimums and approved creep/rupture curves.

08 SERVICE PERFORMANCE

Primary service	Creep, rupture and fatigue strength at elevated temperature
Oxidation	Review scale stability, thermal cycling and atmosphere.
Creep / rupture	Use long-term data at actual stress and temperature.
Fatigue	Assess strain range, dwell time, surface condition and notches.

09 APPLICATIONS

Typical use	Turbine blades · exhaust valves · high-temperature fasteners · springs · hot tooling
Critical review	Confirm weldability, strain-age cracking, coatings and inspection requirements.

Fabrication, Welding & Heat Treatment

10 FORMING & MACHINING

Forming	Use superalloy practice and account for rapid work hardening.
Machining	Rigid setup, sharp tooling, positive feeds and coolant are recommended.

11 WELDING GUIDANCE

Processes	Use qualified aerospace welding procedures.
Filler metal	Select grade-compatible filler and verify hot-service compatibility.
Heat input	Control restraint, interpass temperature and dilution.
Cleanliness	Remove sulfur, oxides, grease and iron contamination.

12 HEAT TREATMENT

Solution treatment followed by controlled aging is required to develop specified strength.

Quality control	Confirm WPS/PQR, heat-treatment records, NDE and traceability.

Product Forms, Standards & Procurement

13 PRODUCT FORMS

Forms	Sheet · plate · bar · wire · forgings · welded fabrications
Condition	Solution treated or aged according to grade and specification

14 RFQ INFORMATION

Material	NIMONIC 80A · UNS N07080 · governing specification
Dimensions	Form, thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, grain size, NDE and special tests
Documents	EN 10204 3.1 MTR, heat traceability and compliance certificates

15 TECHNICAL DISCLAIMER

Values shown are nominal or typical references and may vary by product form, section size, heat treatment and governing specification. They do not replace design calculations, creep or fatigue qualification, applicable aerospace requirements or the certified material test report.

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