RENÉ 41

UNS N07041

Ni–Cr–Co–Mo superalloy

High-strength precipitation-hardened superalloy for demanding turbine and aerospace service.

01 PRODUCT INTRODUCTION

René 41 is a precipitation-hardened nickel-base superalloy combining chromium oxidation resistance with cobalt and molybdenum strengthening. Titanium and aluminum form gamma-prime during aging, producing high tensile, creep and rupture strength. The alloy is used for turbine components, afterburner parts, fasteners and hot structural hardware. Welding and forming require careful control because strain-age cracking and high work-hardening rates can become limiting factors. Final selection should consider product form, heat treatment, atmosphere, design temperature, stress, thermal cycling and the governing aerospace specification.

02 ENGINEERING POSITION

Core advantage	High tensile, creep, rupture and oxidation performance
Applications	Turbine components · afterburner parts · fasteners · hot structural hardware
Material class	Ni–Cr–Co–Mo superalloy

03 COMMON INDUSTRY USE

Industry focus	Turbine components · afterburner parts · fasteners · hot structural hardware
Design note	Use grade-specific creep, rupture, fatigue and heat-treatment data.

Composition & Physical Data

04 CHEMICAL COMPOSITION

Ni	Balance	**Cr**	**18–20%**
Co	10–12%	**Mo**	**9–10.5%**
Ti	3.0–3.3%	**Al**	**1.4–1.8%**
Fe	≤ 5%	**C**	**0.06–0.12%**

05 PHYSICAL PROPERTIES

Density	8.25 g/cm³
Condition	Solution treated / aged by grade
Data status	Typical reference; specification controls acceptance

06 MATERIAL IDENTITY

Common name	RENÉ 41
UNS	N07041
Alloy family	Ni–Cr–Co–Mo superalloy
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	High tensile, creep, rupture and oxidation performance
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 components · afterburner parts · fasteners · hot structural hardware
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 and precipitation aging must follow the governing aerospace specification.

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	RENÉ 41 · UNS N07041 · 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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