

# NIMONIC PE16

UNS N07016

Precipitation-hardenable Ni–Fe–Cr alloy

Fabricable high-temperature alloy with good strength, oxidation resistance and weldability to about 750°C.

## 01 PRODUCT INTRODUCTION

NIMONIC PE16 is a precipitation-hardenable nickel-iron-chromium alloy strengthened by molybdenum, titanium and aluminum. It was designed to combine hot and cold workability with useful high-temperature strength, oxidation resistance and welding characteristics. The grade is used in gas-turbine components, nuclear-reactor hardware and fabricated hot-section parts where balanced strength and manufacturability are required. Final selection should consider product form, heat treatment, atmosphere, design temperature, stress, thermal cycling and the governing aerospace specification.

## 02 ENGINEERING POSITION

|                |                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------|
| Core advantage | Oxidation resistance and precipitation-hardened strength to about 750°C                                 |
| Applications   | Gas-turbine components · nuclear-reactor hardware · hot structural parts · sheet and plate fabrications |
| Material class | Precipitation-hardenable Ni–Fe–Cr alloy                                                                 |

## 03 COMMON INDUSTRY USE

|                |                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------|
| Industry focus | Gas-turbine components · nuclear-reactor hardware · hot structural parts · sheet and plate fabrications |
| Design note    | Use grade-specific creep, rupture, fatigue and heat-treatment data.                                     |

# Composition & Physical Data

## 04 CHEMICAL COMPOSITION

|         |            |    |            |
|---------|------------|----|------------|
| Ni + Co | 42.0–45.0% | Cr | 15.5–17.5% |
| Mo      | 2.8–3.8%   | Al | 1.1–1.3%   |
| Ti      | 1.1–1.3%   | Fe | Balance    |
| C       | 0.04–0.08% | Co | ≤ 2.0%     |

## 05 PHYSICAL PROPERTIES

|             |                                                      |
|-------------|------------------------------------------------------|
| Density     | Approx. 8.15 g/cm <sup>3</sup>                       |
| Condition   | Solution treated / aged by grade                     |
| Data status | Typical reference; specification controls acceptance |

## 06 MATERIAL IDENTITY

|              |                                                             |
|--------------|-------------------------------------------------------------|
| Common name  | NIMONIC PE16                                                |
| UNS          | N07016                                                      |
| Alloy family | Precipitation-hardenable Ni–Fe–Cr 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 | Oxidation resistance and precipitation-hardened strength to about 750°C |
| 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     | Gas-turbine components · nuclear-reactor hardware · hot structural parts · sheet and plate fabrications |
| 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

Typical routes include 1040°C solution treatment followed by staged aging around 700–900°C; use BS HR55/HR207 or customer 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   | NIMONIC PE16 · UNS N07016 · 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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