HAYNES® 242

UNS N10242

Age-hardenable Ni–Mo–Cr alloy

Low-expansion age-hardenable alloy with strength and thermal stability to intermediate temperatures.

01 PRODUCT INTRODUCTION

HAYNES 242 is an age-hardenable nickel-molybdenum-chromium alloy developed for high strength, low thermal expansion and excellent thermal stability. It derives strengthening from a long-range ordered phase formed during aging rather than from conventional gamma-prime precipitation. The alloy offers good oxidation resistance and dimensional stability for seals, rings, containment components and hot structural hardware. Its properties are highly dependent on solution treatment, cold work and the prescribed aging cycle. Final selection should consider product form, heat treatment, design temperature, atmosphere, stress state, thermal cycling and the applicable AMS specification.

02 ENGINEERING POSITION

Core advantage	High strength, low thermal expansion and dimensional stability to intermediate temperatures
Applications	Gas-turbine seals · containment rings · fasteners · springs · precision hot structures
Material class	Age-hardenable Ni–Mo–Cr alloy

SELECTION NOTE **Use grade-specific creep, rupture, oxidation and heat-treatment data for final engineering design.**

03 COMMON INDUSTRY USE

Industry focus	Gas-turbine seals · containment rings · fasteners · springs · precision hot structures
Identity	HAYNES® 242 · UNS N10242

Composition & Physical Data

Nominal composition and typical physical constants.

04 CHEMICAL COMPOSITION

WEIGHT %

Ni	Balance	Mo	24–26%
Cr	7–9%	Co	≤ 2.5%
Fe	≤ 2%	C	≤ 0.03%
Al	0.2–0.5%	B	≤ 0.006%

SOURCE CONTROL Use the governing AMS or customer specification and certified MTR for acceptance.

05 TYPICAL PHYSICAL PROPERTIES

Density	9.05 g/cm³	Melting range	Approx. 1300–1350°C
Condition	Solution treated / aged	Data status	Typical reference
Magnetism	Low permeability	Temperature	Grade dependent

06 MATERIAL IDENTITY

Common name	HAYNES® 242 alloy
UNS	N10242
Alloy family	Age-hardenable Ni–Mo–Cr alloy
Reference specs	AMS 5951 sheet/plate · AMS 5952 bar/forgings · grade-specific aerospace specifications

ACCEPTANCE RULE Nominal chemistry and typical physical data do not replace the certified material test report.

Mechanical & High-Temperature Performance

Condition-dependent strength, oxidation and thermal-service guidance.

07 MECHANICAL PROPERTIES

Strength basis	Product form, solution treatment, cold work and aging determine tensile and yield properties.
Design data	Use specification minimums and code- or manufacturer-approved creep and rupture data.

08 SERVICE PERFORMANCE

Primary service	High strength, low thermal expansion and dimensional stability to intermediate temperatures
Oxidation	Assess scale formation, spallation, atmosphere and thermal cycling.
Hot corrosion	Review carburization, nitriding, sulfidation and molten-salt exposure separately.
Creep / rupture	Use long-term data at the actual design temperature and stress.
Welded service	Review filler metal, joint design, strain-age cracking and post-weld heat treatment.

09 TYPICAL APPLICATIONS

Industries	Gas-turbine seals · containment rings · fasteners · springs · precision hot structures
Critical review	Confirm atmosphere, temperature gradients, fatigue, creep and fabrication condition.

IMPORTANT

Typical values are screening data. Aerospace and pressure-service acceptance is controlled by the governing specification.

Fabrication, Welding & Heat Treatment

Process controls for high-temperature alloy performance.

10 FORMING & MACHINING

Cold forming	Use nickel/cobalt superalloy practice and account for work hardening.
Machining	Rigid setup, sharp tooling, positive feed and adequate coolant are recommended.
Hot working	Use the grade-specific temperature range and avoid prolonged reheating.

11 WELDING GUIDANCE

Processes	GTAW, GMAW and other qualified fusion processes may be used.
Filler metal	Select grade-compatible filler metal and confirm high-temperature service compatibility.
Heat input	Control interpass temperature, dilution and restraint.
Cleanliness	Remove oxides, sulfur-bearing compounds and iron contamination.

12 HEAT TREATMENT

Solution treatment followed by controlled aging is required to develop the specified strength and dimensional stability.

QUALITY CONTROL **Confirm WPS/PQR, heat-treatment records, NDE, surface condition and traceability.**

Product Forms, Standards & Procurement

A practical specification and quotation checklist.

13 REFERENCE STANDARDS

AMS 5951 sheet/plate · AMS 5952 bar/forgings · grade-specific aerospace specifications

14 COMMON PRODUCT FORMS

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

15 RFQ INFORMATION

Material	HAYNES® 242 · UNS N10242 · governing AMS/customer specification
Dimensions	Form, thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, grain size, NDE and customer-specific tests
Documents	EN 10204 3.1 MTR, heat traceability and compliance certificates

16 TECHNICAL DISCLAIMER

Values shown are nominal or typical references and may vary by product form, thickness, heat treatment and governing specification. They do not replace engineering design calculations, oxidation or creep testing, applicable codes or the certified material test report.

Source basis	Haynes International published alloy data and applicable AMS product specifications