

MONEL® K-500

UNS N05500 · W.Nr. 2.4375

Age-hardenable Ni–Cu–Al–Ti alloy

High-strength MONEL for shafts, fasteners and marine components requiring corrosion resistance.

01 PRODUCT INTRODUCTION

MONEL K-500 combines the seawater and caustic resistance of the MONEL 400 family with substantially higher strength from aluminum- and titanium-bearing precipitates. After solution treatment and controlled aging, it is used for shafts, pump components, fasteners, springs, oil-well tools and marine hardware that must resist both corrosion and mechanical loading. The aged condition is essential to the specified strength and can reduce ductility compared with annealed material. Service review should include hydrogen effects, sulfides, stress concentration, seawater velocity and galvanic contact. Specify the product form, aging route and inspection requirements together.

02 ENGINEERING POSITION

Core advantage	Marine and seawater service where higher strength than MONEL 400 is required
Applications	Pump and valve shafts · oil-well tools · marine propeller shafts · fasteners · springs · sensor components
Material class	Age-hardenable Ni–Cu–Al–Ti alloy

SELECTION NOTE

Confirm media, temperature, velocity, crevice geometry, heat treatment and code requirements before final specification.

03 COMMON INDUSTRY USE

Industry focus	Pump and valve shafts · oil-well tools · marine propeller shafts · fasteners · springs · sensor components
Identity	MONEL® K-500 · UNS N05500

Composition & Physical Data

Official limiting composition and typical physical constants.

04 CHEMICAL COMPOSITION

WEIGHT %

Ni	≥ 63.0%	Cu	27.0–33.0%
Al	2.30–3.15%	Ti	0.35–0.85%
Fe	≤ 2.0%	Mn	≤ 1.5%
C	≤ 0.25%	Si	≤ 0.50%

SOURCE CONTROL

Use the applicable ASTM or ASME product specification and certified MTR for acceptance.

05 TYPICAL PHYSICAL PROPERTIES

ROOM TEMPERATURE

Density	8.44 g/cm³	Melting range	1315–1350°C
Specific heat	Approx. 430–460 J/kg·°C	Condition	Annealed / aged
Magnetism	Low permeability	Data status	Typical reference

06 MATERIAL IDENTITY

Common name	MONEL® alloy K-500
UNS / W.Nr.	N05500 / 2.4375
Alloy family	Age-hardenable Ni–Cu–Al–Ti alloy
Product standard	ASTM B865 · B865-type product requirements · ASME SB-865 where applicable

ACCEPTANCE RULE

Physical and chemistry references do not replace the certified material test report.

Mechanical & Service Performance

Condition-dependent strength and corrosion-selection guidance.

07 MECHANICAL PROPERTIES

Aged product commonly reaches approximately 1000 MPa tensile and 690 MPa yield strength; exact values depend on product form and aging treatment.

08 SERVICE PERFORMANCE

Primary service	Marine and seawater service where higher strength than MONEL 400 is required
Water / chlorides	MONEL alloys are widely used in seawater and chloride-containing service; assess crevices and flow conditions.
Reducing media	Hydrofluoric and non-oxidizing acids require concentration and temperature review.
Oxidizing media	Avoid broad assumptions; oxidizing acid conditions may require a different nickel alloy.
Temperature	Use grade-specific creep, rupture and allowable-stress data at elevated temperature.

09 TYPICAL APPLICATIONS

Industries	Pump and valve shafts · oil-well tools · marine propeller shafts · fasteners · springs · sensor components
Critical review	Review galvanic coupling, seawater velocity, sulfides, erosion and stress state as applicable.

IMPORTANT

Official values are representative. Critical service requires code compliance, certified material data and suitable corrosion review.

Fabrication, Welding & Heat Treatment

Practical controls for maintaining alloy performance.

10 FORMING & MACHINING

Cold forming	Good ductility in annealed conditions; account for work hardening in heavy forming.
Machining	Rigid setup, sharp tooling, positive feed and coolant help control work hardening.
Hot working	Use product-specific temperature windows and avoid prolonged reheating.

11 WELDING GUIDANCE

Processes	GTAW, GMAW and SMAW may be used with qualified procedures.
Filler metal	Select a filler compatible with MONEL grade and service environment.
R-405 note	R-405 is optimized for machining; do not assume it is interchangeable with MONEL 400 for welding.
Cleanliness	Remove oil, grease, oxides and iron contamination before welding.

12 HEAT TREATMENT

Solution anneal followed by controlled precipitation aging; heat treatment is essential to achieve specified strength.

QUALITY CONTROL Confirm WPS/PQR, filler metal, surface cleaning, NDE, heat treatment and traceability.

Product Forms, Standards & Procurement

A practical specification and quotation checklist.

13 REFERENCE STANDARDS

ASTM B865 · B865-type product requirements · ASME SB-865 where applicable

14 COMMON PRODUCT FORMS

Forms	Plate · sheet · strip · bar · wire · pipe · tube · fittings · forgings
Condition	Annealed, stress relieved, cold worked or age hardened by grade

15 RFQ INFORMATION

Material	MONEL® K-500 · UNS N05500 · governing ASTM/ASME specification
Dimensions	Form, OD/ID, wall or thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, PMI, NDE and customer-specific tests
Documents	EN 10204 3.1 MTR, heat traceability and compliance certificates

16 TECHNICAL DISCLAIMER

Values shown are typical or specification-level references and may vary by product form, thickness, heat treatment and governing standard. They do not replace engineering design calculations, corrosion review, applicable codes or the certified material test report.

Source basis	Special Metals technical literature and applicable ASTM / ASME product standards
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