

MONEL® 400

UNS N04400 · W.Nr. 2.4360/2.4361

Ni–Cu alloy

A versatile nickel-copper alloy for seawater, hydrofluoric acid and marine service.

01 PRODUCT INTRODUCTION

MONEL 400 combines high nickel and copper to provide broad resistance in seawater, brine, hydrofluoric acid, caustic alkalies and many non-oxidizing chemical streams. It is widely selected for marine piping, heat exchangers, pumps and chemical vessels because it resists chloride-ion stress-corrosion cracking and retains useful toughness at subzero temperatures. The alloy is not precipitation hardenable; strength is adjusted through cold work and product condition. Oxidizing acid service, stagnant crevices, sulfide contamination and galvanic couples require separate engineering review. Confirm product form, annealing condition and the applicable ASTM specification before purchase.

02 ENGINEERING POSITION

Core advantage	Seawater, hydrofluoric acid, caustic alkalies and non-oxidizing chemical service
Applications	Marine hardware · seawater piping · chemical tanks · heat exchangers · HF acid equipment · oil and gas components
Material class	Ni–Cu alloy

SELECTION NOTE

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

03 COMMON INDUSTRY USE

Industry focus	Marine hardware · seawater piping · chemical tanks · heat exchangers · HF acid equipment · oil and gas components
Identity	MONEL® 400 · UNS N04400

Composition & Physical Data

Official limiting composition and typical physical constants.

04 CHEMICAL COMPOSITION

WEIGHT %

Ni	≥ 63.0%	Cu	28.0–34.0%
Fe	≤ 2.5%	Mn	≤ 2.0%
C	≤ 0.30%	Si	≤ 0.50%
S	≤ 0.024%	Al	—

SOURCE CONTROL

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

05 TYPICAL PHYSICAL PROPERTIES

ROOM TEMPERATURE

Density	8.80 g/cm ³	Melting range	1300–1350°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 400
UNS / W.Nr.	N04400 / 2.4360/2.4361
Alloy family	Ni–Cu alloy
Product standard	ASTM B127 · B164 · B165 · B730 · B163 · B366

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

Typical annealed minimums depend on product form; common plate/rod requirements are about 517 MPa tensile, 170 MPa yield and 35% elongation.

08 SERVICE PERFORMANCE

Primary service	Seawater, hydrofluoric acid, caustic alkalies and non-oxidizing chemical service
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	Marine hardware · seawater piping · chemical tanks · heat exchangers · HF acid equipment · oil and gas 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

Annealed, stress-relieved or cold-worked conditions are selected by product form and required 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 B127 · B164 · B165 · B730 · B163 · B366

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® 400 · UNS N04400 · 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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