

Procurement White Paper

MONEL 400

UNS N04400 | Nickel-copper alloy for reducing acids, marine service, and corrosion-resistant fasteners

Target audience: procurement, sourcing, and QA professionals supporting chemical processing, marine, and industrial operations.

At-a-glance	
<p>What it is</p> <p>A nickel-copper (Ni-Cu) solid-solution alloy. It is single-phase and is strengthened primarily by cold work (not heat treat). It offers broad corrosion resistance in reducing media and performs well in many marine and industrial-water environments.</p>	<p>Typical reasons to specify</p> <p>Seawater/brackish-water service and marine hardware; chemical-processing service in reducing acids (notably hydrofluoric acid) and many alkalis; pump/valve/heat-exchanger components; and corrosion-resistant fasteners where stainless steels may suffer chloride stress-corrosion cracking or rapid general corrosion.</p>
<p>Common supply forms</p> <p>Plate/sheet/strip, bar/rod/wire, seamless and welded pipe/tube, forgings, and fittings; fasteners are commonly machined from bar or produced from wire/rod where available.</p>	<p>Key identifiers</p> <p>UNS N04400 (also sold as Monel 400 / Alloy 400). Frequently ordered to ASTM/ASME B127 (plate/sheet/strip), B164 (bar/wire), B165/B163 (seamless pipe/tube & heat-exchanger tube), B725/B730 (welded pipe/tube), B564 (forgings), and B366 (fittings).</p>

Disclaimer: This paper is provided for informational use by purchasing and QA teams. It is not engineering advice. Final material selection, design allowables, and installation practices must be approved by qualified engineering for the specific service conditions.

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Executive summary

MONEL 400 (UNS N04400) is a widely specified nickel-copper alloy used across chemical processing and marine service. Its procurement value is predictable performance in reducing environments (including hydrofluoric acid) and stable, well-established product-form specifications. [1] For buying teams, the main success factors are: (1) citing the correct standard for the purchased form (plate vs bar vs pipe/tube), (2) locking in the required temper/condition (annealed vs cold-worked) because strength and hardness vary with cold work, and (3) controlling corrosion-service assumptions (aeration/stagnation, oxidizers) that can change expected performance. [1][2]

Where MONEL 400 fits

MONEL 400 is often selected when the environment is reducing (low-oxidizer) and chloride-bearing, such as seawater, brines, and many industrial waters. It is generally not the first choice for strongly oxidizing acids (for example, nitric acid) or oxidizing salt solutions where Ni-Cr-Mo alloys or stainless grades may be specified instead. [1]

Common chemical-processing and industrial use cases

- Hydrofluoric-acid (HF) service: pickling, alkylation-related equipment, and HF-containing process streams (validate specific conditions). [1]
- Seawater/brackish-water and salt-solution service: piping components, heat exchangers, marine fixtures, and fasteners. [1]
- Caustic/alkali service and many neutral salts where stress-corrosion cracking of stainless can be a concern.
- Valves, pumps, and hardware for chemical-processing utilities where wet exposure and chloride-bearing water drives material choice.

Fastener-focused considerations

- **Temper/strength control:** specify annealed vs cold-worked condition for bolting and threaded rod; do not assume mechanical properties. [1]
- **Galling control:** nickel alloys can gall in threaded joints; define lubrication/coating requirements, torque-tension expectations, and installation practices.
- **Thread and geometry:** call out ASME B18 geometry and thread class; define any underhead radius, washer face, or venting requirements up front.
- **Environment match:** MONEL 400 fits reducing, chloride-bearing service; validate for oxidizers, stagnant seawater crevice risk, and galvanic couples.

Buying it right: product-form specifications

Use the table below to align RFQs and purchase orders with the correct standards for the exact product form being purchased.

Product form (common)	Typical standards / specs to cite in RFQs	Procurement notes
Plate / Sheet / Strip	ASTM/ASME B127.	Define finish and thickness tolerance; require MTRs and heat/lot traceability.
Rod / Bar / Wire	ASTM/ASME B164.	For machined fasteners: specify bar temper/condition and documentation; add UT/ET if required.
Pipe / Tube (seamless)	ASTM/ASME B165 (general seamless). For HX/condenser tube, ASTM/ASME B163 may apply.	Call out OD/WT/length tolerances and NDE/hydrotest requirements; prefer seamless for higher-risk duties.
Pipe (welded)	ASTM B725.	Define weld method, PWHT/stress relief (if any), NDE, and documentation; consider seamless in crevice-prone service.
Tube (welded)	ASTM B730.	Define weld method, heat treatment, and NDE; align spec to pressure/temperature duty and customer requirements.
Fittings	ASTM/ASME B366/B366M. Dimensional: ASME B16.9/B16.11 as applicable.	Match chemistry to parent material; require PMI and traceability; specify NDE per B366/B366M.

Buying it right: continued

Product form (common)	Typical standards / specs to cite in RFQs	Procurement notes
Fasteners	Common purchase paths: <ul style="list-style-type: none"> • Finished fasteners per ASTM F467 (bolting) / ASTM F468 (nuts) where applicable. • Machined fasteners from ASTM B164 bar stock with mechanical/property requirements in the PO. 	Define thread class, head style, and geometry per ASME B18; specify anti-galling measures (lubricants/coatings) and required temper/condition; verify marking and lot traceability.
Welding products	Filler metals commonly specified as ERNiCu-7 (AWS A5.14) for GTAW/GMAW, with matching covered electrodes ENiCu-7 (AWS A5.11) where compatible with procedure.	Weld procedure qualification drives risk. Call out any PWHT/anneal needs, max interpass temperature, and required post-weld pickling/passivation or cleaning.
Sour service / H2S	If required: NACE MR0175 / ISO 15156 compliance language.	Confirm hardness limits and condition requirements with QA/engineering; require traceability and documented heat treatment/temper.

Documentation, inspection, and traceability

- Require mill test reports (MTRs) showing heat/lot, chemistry, mechanical properties, and temper/condition per the cited ASTM/ASME standard. [3][4][5]
- Define positive material identification (PMI) expectations for received lots (especially for fittings and finished fasteners).
- For critical service, specify additional testing as needed (ET/UT, hydrotest, corrosion testing) per engineering requirements and applicable standards.

Lead-time drivers

Lead time is driven by melt availability, required size (bar diameter, plate thickness, or pipe schedule), and downstream processing (forging, machining, NDE). For fasteners, long lead time is often caused by limited qualified machining capacity, coating/lubrication requirements, and lot-level documentation.

Fabrication and welding notes

Procurement teams are often asked to source both base metal and welding consumables. MONEL 400 is readily fabricated and welded when procedures are qualified; however, corrosion performance in seawater and reducing acids depends on surface condition, cleanliness, and avoidance of crevices. [1]

Welding and fabrication procurement callouts

- Confirm whether the buyer requires anneal after fabrication; specify heat treatment requirements before placing orders.
- Define surface-condition expectations after welding (pickling, cleaning, or passivation as applicable) to avoid embedded iron and restore corrosion resistance.
- For welded pipe/tube purchases, confirm accepted revision and ensure the supplier can provide required NDE and weld documentation.

Sour-service / H2S note

If equipment or fasteners may see H2S-containing environments, include explicit compliance language for NACE MR0175 / ISO 15156 and verify hardness limits and condition requirements with QA/engineering.

Procurement checklist

- **Material designation:** MONEL 400 / UNS N04400 (include alternate trade names only if helpful).
- **Product form & standard:** cite the exact ASTM/ASME standard for the purchased form (B127, B164, B165, B725, B366, etc.). [3][4][5][6]
- **Temper/condition:** annealed vs cold-worked; define minimum mechanicals if required; do not assume.
- **Dimensions & tolerances:** size, schedule/thickness, straightness, length, and any machining allowances.
- **Testing & inspection:** MTRs, PMI, NDE, hydrotest, and any supplemental corrosion tests required by spec or customer.
- **Fastener specifics:** thread class, head style, length under head, washers, coatings/lube, packaging, and lot traceability.
- **Marking:** part marking requirements (manufacturer ID, heat/lot, material grade) and packaging labels.
- **Compliance:** code/standard requirements (ASME, NACE/ISO for sour service, customer specs), plus export/documentation constraints.

References

[1] Special Metals. "MONEL alloy 400" technical bulletin (pdf).

<https://www.specialmetals.com/assets/smc/documents/alloys/monel/monel-alloy-400.pdf>

[2] Nickel Systems. "Monel 400 Fasteners" materials page (web).

<https://www.nickel-systems.com/materials/monel-400/>

[3] ASTM B127 - Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip (ASTM).

<https://www.astm.org/b0127-05r09.html>

[4] ASTM B164 - Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire (ASTM).

<https://www.astm.org/b0164-03r19.html>

[5] ASTM B165 - Standard Specification for Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube (ASTM).

<https://www.astm.org/b0165-19.html>

[6] ASTM B725 / ASTM B730 - Welded Nickel and Nickel-Copper Alloy Pipe/Tube (ASTM).

<https://www.astm.org/b0725-22.html> ; <https://www.astm.org/b0730-08r18.html>

[7] ASTM B366/B366M - Factory-Made Wrought Nickel Alloy Fittings (ASTM).

https://www.astm.org/b0366_b0366m-20.html

[8] ASTM F467 / ASTM F468 - Nonferrous Nuts and Bolts/Studs for General Use (ASTM).

<https://www.astm.org/f0467-13r18.html> ; <https://www.astm.org/f0468-16.html>

[9] Special Metals. "MONEL Filler Metal 60 (ERNiCu-7)" specification sheet (pdf).

<https://www.specialmetals.com/divisions/welding-products/tradenames/monel/fm60.pdf>