

Procurement White Paper

K-MONEL 500

UNS N05500 | Age-hardenable Ni-Cu alloy for high-strength, corrosion-resistant fasteners and demanding chemical-process hardware

Audience:

procurement, sourcing, and quality teams supporting chemical processing equipment and corrosion-resistant fasteners.

At-a-glance

What it is

A precipitation-hardenable nickel-copper alloy (Ni-Cu with Al and Ti additions) that provides much higher strength and hardness than Monel 400 while maintaining similar corrosion behavior in many environments. [1][2]

Typical reasons to specify

High-strength fasteners (bolts, studs, springs) and marine/chemical hardware where Monel 400-level corrosion resistance is desired but mechanical strength, wear, erosion, or corrosion fatigue drive the selection. [1][2]

Common supply forms

Bar/rod/wire and forging stock (common for machined fasteners), plus plate/sheet/strip, and select pipe/tube and specialty forms depending on mill availability. [1]

Key identifiers

UNS N05500 (Werkstoff 2.4375). Common trade names include MONEL alloy K-500 and K-Monel. Listed in NACE MR0175 for certain oil and gas service conditions. [1]

This document is a purchasing guide (not an engineering design standard). Final material selection, code compliance, sour-service limits, and welding procedures must be validated for the specific service environment and applicable regulations.

Version 1.1 | February 17, 2026

Executive summary

K-Monel 500 (UNS N05500) is an age-hardenable nickel-copper alloy used when buyers need Monel-class corrosion resistance with significantly higher mechanical strength. Procurement success typically depends on (1) citing the correct product-form specification (bar vs plate vs wire), (2) specifying the required condition (annealed vs age-hardened) and hardness/property verification, and (3) controlling fastener risks such as galling, thread fit, and traceability in chloride, marine, or sour-gas environments. [1][2]

Where K-Monel 500 fits

K-Monel 500 is often selected when Monel 400 is corrosion-appropriate but does not provide enough strength for the duty cycle (higher clamp loads, wear, or fatigue). Because it is precipitation hardened, it can be supplied in multiple strength/hardness ranges, which should be explicitly controlled in RFQs and receiving. [1][2]

Common chemical-processing use cases

- Pump and valve components, mixing shafts/impellers, and instrumentation parts where corrosion resistance and strength are both important. [2]
- Chemical-process and marine hardware exposed to seawater or brines (with attention to crevice/pitting risk in stagnant conditions). [2]
- Oil and gas equipment components and fasteners where sour-gas exposure is possible and MR0175/ISO 15156 language is required. [1]

Fastener-focused considerations for procurement

- **Condition and hardness control:** specify annealed vs age-hardened (or target hardness/strength range). K-500 properties vary widely by processing; include hardness checks on critical lots. [1][2]
- **Manufacturing route:** many K-500 fasteners are machined from bar/rod (ASTM B865 / AMS 4676); confirm any grain-flow requirements for critical studs/bolting. [1]
- **Galling/assembly control:** nickel alloys can gall; require approved lubricant or coating and define torque-tension expectations for critical joints.
- **Traceability:** require heat/lot traceability, MTRs, and PMI on receiving for mixed-alloy inventories.

Buying it right: product forms and specifications

A frequent procurement issue is mixing product-form standards (for example, quoting plate chemistry for bar applications, or using a generic wire spec for forged parts). Use the table below as an RFQ/PO checklist and align the cited standard to the actual form factor being purchased. [1]

Product form (common)	Typical standards / specs to cite in RFQs	Procurement notes
Plate / Sheet / Strip	BS3072 NA18 (sheet & plate), BS3073 NA18 (strip); also seen: QQ-N-286; DIN 17750; ISO 6208. [1]	Define finish and tolerance; require heat/lot traceability; confirm required anneal condition.
Rod / Bar / Wire / Forgings	ASTM B865 (rod & bar); SAE AMS 4676 (rod & bar); also seen: QQ-N-286; DIN 17752/17753/17754; ISO 9723/9724/9725. [1]	Primary feedstock for machined fasteners. Specify condition (annealed vs aged) and property verification (hardness + tensile).
Pipe / Tube	BS3074 NA18 (seamless pipe & tube); DIN 17751. [1]	Confirm availability; define NDE/hydrotest requirements and any corrosion test expectations.
Welding products	MONEL Filler Metal 60 / AWS A5.14 ERNiCu-7. [1][2]	Weld metal is generally not age-hardenable to match aged base-metal strength; avoid welding age-hardened material when ductility is critical. [1]
All forms (sour-service)	Listed in NACE MR0175. [1]	If sour service applies, include explicit MR0175/ISO 15156 language and confirm hardness/condition limits with engineering.

Quality, documentation, and sourcing controls

Because K-500 can be supplied in multiple strength conditions, procurement and receiving should treat condition control as a primary risk driver (similar to other precipitation-hardenable alloys). [1][2]

Minimum documentation to require

- Mill Test Report (MTR) showing chemistry to UNS N05500 and the governing product-form specification cited on the PO. [1]
- Heat/lot traceability on all cut lengths and finished fasteners; require lot identification on packaging.
- Mechanical properties and hardness for the supplied condition; include test method and sampling plan. [1][2]
- PMI requirements (100% or per lot) for mixed-alloy inventories or high-consequence joints.

Fastener assembly risk controls

- Galling mitigation: specify approved lubricant or coating; define installation procedure for critical joints.
- Thread fit: call out thread class and gauge requirements; include coating thickness limits if applicable.
- Condition verification: perform incoming hardness checks for age-hardened fasteners; correlate to required strength range when specified. [1][2]

RFQ / PO checklist (copy/paste)

- **Material:** K-Monel 500 (UNS N05500) / Werkstoff 2.4375. [1]
- **Product form & spec:** cite the exact product-form standard (e.g., ASTM B865 bar; AMS 4676 bar; QQ-N-286). [1]
- **Condition:** annealed or age-hardened; include target hardness/strength range and required testing. [1][2]
- **Dimensions & tolerances:** size, straightness, finish, and any special requirements (surface, grain flow, etc.).
- **Documentation:** MTRs, heat/lot traceability, PMI requirements, mechanical/hardness test reports.
- **Compliance:** if sour service applies, include MR0175/ISO 15156 language and hardness constraints per engineering. [1]
- **For fasteners:** ASME B18 geometry, thread class, lubricant/coating requirements, and installation control plan for critical joints.

Receiving inspection (quick guide)

- Verify part marking and packaging traceability (heat/lot) matches documentation.
- Review MTR chemistry for UNS N05500 and confirm the stated product-form spec matches the PO. [1]
- Perform PMI (as required) and hardness checks for age-hardened lots; quarantine out-of-range material pending disposition. [2]
- For critical fasteners: verify thread gaging, surface condition, and any coating/lubricant requirements.

References

[1] Special Metals. "MONEL alloy K-500" Technical Bulletin (UNS N05500).
<https://www.specialmetals.com/documents/technical-bulletins/monel-alloy-k-500.pdf>

[2] Corrosion Materials. "Alloy K-500 Data Sheet" (applications, fabrication, welding note on ERNiCu-7).
<https://www.corrosionmaterials.com/wp-content/uploads/docs/alloyK500DataSheet.pdf>