

SOUTHERLY ALLOY

Monel K-500 | UNS N05500 | Werkstoff Nr. 2.4375 / NiCu30Al

ASTM B865 / ASME SB865 — Age-Hardenable Nickel-Copper Alloy, All Product Forms

Product Description

Monel K-500 is a precipitation-hardenable nickel-copper alloy that carries 2.30–3.15% aluminium and 0.35–0.85% titanium in the UNS N05500 balance. A controlled aging cycle lifts yield strength to roughly three times the Monel 400 figure, so the alloy serves seawater, brine, and reducing-acid duty where the solid-solution grade lacks the strength. It remains essentially non-magnetic and keeps its toughness at cryogenic temperature.

Chemical Composition (ASTM B865)

Element	Content	Element	Content
Nickel (Ni) plus Cobalt (Co)	63.0% min.	Iron (Fe), max.	2.0%
Copper (Cu)	27.0–33.0%	Manganese (Mn), max.	1.5%
Aluminium (Al)	2.30–3.15%	Carbon (C), max.	0.18%
Titanium (Ti)	0.35–0.85%	Silicon (Si), max.	0.50%
Sulfur (S), max.	0.010%	Strengthening route	Age hardening, Ni ₃ (Ti,Al)

Minimum Room-Temperature Mechanical Properties, Age-Hardened (ASTM B865 Table 5)

Condition / Section	Tensile Strength	Yield Strength, 0.2% Offset	Elongation	Basis
Hot-worked and age-hardened, all sizes	≥ 140 ksi (965 MPa)	≥ 100 ksi (690 MPa)	20%	B865
Cold-worked and age-hardened, rounds 6.4–25.4 mm (1/4–1 in.)	≥ 145 ksi (1000 MPa)	≥ 110 ksi (760 MPa)	15%	B865
Cold-worked and age-hardened, rounds 25.4–76.2 mm (1–3 in.)	≥ 140 ksi (965 MPa)	≥ 100 ksi (690 MPa)	17%	B865
Cold-worked and age-hardened, rounds 76.2–101.6 mm (3–4 in.)	≥ 135 ksi (930 MPa)	≥ 95 ksi (655 MPa)	20%	B865
Annealed and age-hardened, rounds to 25.4 mm (1 in.)	≥ 130 ksi (895 MPa)	≥ 90 ksi (620 MPa)	20%	B865
Annealed and age-hardened, rounds over 25.4 mm (1 in.)	≥ 130 ksi (895 MPa)	≥ 85 ksi (585 MPa)	20%	B865

Unaged material follows hardness acceptance instead: annealed stock is capped at 185 HB (90 HRB) and no tensile minimum applies. Hardness rows in the standard serve for information only. Sections over 108 mm (4-1/4 in.) carry a 17% elongation minimum.

Physical Properties (typical values)

Property	Value	Property	Value
Density	Approx. 8.44 g/cm ³	Electrical resistivity, 20 °C	Approx. 0.615 μΩ·m
Melting range	Approx. 1315–1350 °C	Thermal expansion, 20–100 °C	Approx. 13.7 μm/m·K
Modulus of elasticity	Approx. 179 GPa	Curie temperature	Approx. -101 °C (-150 °F)
Thermal conductivity, 20 °C	Approx. 17.5 W/m·K	Magnetic behaviour	Essentially non-magnetic
Specific heat, 20 °C	Approx. 419 J/kg·K	Service ceiling	Approx. 480 °C before overaging

Applicable Standards

Standard / Designation	Scope
ASTM B865 / ASME SB865	Chemistry and aged acceptance values; bar, rod, wire, and forgings
SAE AMS 4676	Bars, forgings, and rings, 67Ni - 29Cu - 3Al
AMS-QQ-N-286	Federal specification covering K-500 plate, sheet, strip, bar, and wire
DIN 17750 / ISO 6208	Flat-rolled product — plate, sheet, and strip
DIN 17751 / BS 3074 NA18	Seamless pipe and tube
DIN 17752 / BS 3076 NA18	Bar and rod
DIN 17743 / ISO 9723-9725	Wrought nickel-copper alloys; bar, wire, and forging stock
NACE MR0175 / ISO 15156-3	Sour service; aged product at 35 HRC max
UNS N05500 · W.Nr. 2.4375 · NiCu30Al	Designations

ASTM B865 scope stops at bar, rod, wire, and forgings. ASTM B622 excludes UNS N05500, and ASTM B127 is written for UNS N04400, so tube and flat-rolled orders name the documents listed above.

Typical Supply Dimensions

Product Form	Typical Supply Range	Length
Bar and rod	6–500 mm dia.	Cut to length or random
Seamless pipe	6–219 mm outside dia.	Random or fixed
Heat-exchanger tube	6–25.4 mm outside dia., wall 0.5–2 mm	Fixed
Plate	4.76–100 mm thick, to 2000 mm wide	Up to 6000 mm
Sheet	0.46–6.4 mm thick, to 1500 mm wide	Up to 6000 mm
Strip	0.13–6.4 mm thick, to 600 mm wide	Coil or cut length

Age hardening per B865: hold at 595 °C (1100 °F) for 8–16 h, then furnace-cool at 10–15 °C per hour to 480 °C and air-cool. Rough machine before aging; the section contracts slightly.

Filler metal: ERNiCu-7.

Southerly Alloy — nickel alloy bar, rod, pipe, tube, plate and fittings · www.southerly-alloy.com · Values are for reference; the mill test certificate prevails for final acceptance.

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