

SOUTHERLY ALLOY

Incoloy 825 Plate and Sheet | UNS N08825 | Werkstoff Nr. 2.4858 | NiCr21Mo

ASTM B424 / ASME SB424 (with B906) — Rolled Plate, Sheet, and Strip

Product Description

Incoloy 825 plate, sheet, and strip serves acid vessel shells, evaporator bodies, ducting, and tube-sheet stock. ASTM B424 covers every rolled form and gives all five of them one annealed minimum, so strength never drives the form choice. B906 supplies the tolerances and the definitions that separate plate from sheet and from strip. Copper and molybdenum resist sulfuric and phosphoric acid, and the titanium addition keeps the heat-affected zone resistant to intergranular attack, so most vessels release as welded. Cut-to-size plate, circle blanks, and profiled shapes ship with the heat number on every piece.

Chemical Composition

Element	Content (UNS N08825)
Nickel (Ni)	38.0–46.0%
Chromium (Cr)	19.5–23.5%
Iron (Fe)	22.0% min. (balance)
Molybdenum (Mo)	2.5–3.5%
Copper (Cu)	1.5–3.0%
Titanium (Ti)	0.6–1.2%
Carbon (C)	0.05% max.
Manganese (Mn)	1.00% max.
Silicon (Si)	0.50% max.
Aluminium (Al)	0.20% max.
Sulfur (S)	0.03% max.

One composition row serves ASTM B423, B424, B425, B163, B704, and B705, because the grade has a single analysis window across every product form.

Minimum Room-Temperature Mechanical Properties (ASTM B424)

Standard / Form and Condition	Tensile Strength, min.	Yield Strength (0.2%), min.	Elongation, min.
Hot-rolled plate – annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%
Cold-rolled plate – annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%
Hot-rolled sheet – annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%
Cold-rolled sheet – annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%
Cold-rolled strip – annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%
B564 forgings and tube sheets – solution annealed	≥ 85 ksi (586 MPa)	≥ 35 ksi (241 MPa)	30%

The yield requirement does not apply below 0.020 in. (0.51 mm) thickness, and the strip elongation minimum falls away below 0.010 in. (0.25 mm). ASTM B423 and B163 govern the tubular forms of the same grade, and B425 governs bar.

Product Form Definitions (ASTM B906)

Product Form	Thickness	Width	Rolling Route
Plate	3/16 in. (4.76 mm) and over	Over 10 in. (250 mm)	Hot-rolled or cold-rolled
Sheet	Under 4.76 mm	24 in. (600 mm) and over	Hot-rolled or cold-rolled
Strip	Under 4.76 mm	Under 600 mm	Cold-rolled

Thickness and width together decide the form, so an order has to name both. Coil delivery is a packaging choice and does not change the defined form.

Physical Properties (typical values)

Property	Value
Density	Approx. 8.14 g/cm ³
Melting range	Approx. 1370–1400 °C
Specific heat at 20 °C	Approx. 440 J/kg·K
Modulus of elasticity at 20 °C	Approx. 196 GPa
Thermal conductivity at 25 °C	Approx. 11.1 W/m·K
Thermal expansion, 20–100 °C	Approx. 14.1 µm/m·°C
Electrical resistivity at 25 °C	Approx. 1.13 µΩ·m
Curie temperature	Below –196 °C
Magnetic behaviour	Non-magnetic at ambient temperature

Typical room-temperature values from the Special Metals bulletin for the grade. They support design work rather than acceptance testing.

Applicable Standards

Standard / Designation	Scope
ASTM B424 / ASME SB424 (with B906)	Rolled plate, sheet, and strip – UNS N08825
ASTM B906 / ASME SB906	General requirements: tolerances, sampling, and the definitions of plate, sheet, and strip
ASTM B425 / B423 / B163	Rod and bar, seamless pipe and tube, and exchanger tube in the same grade
ASTM B564 / B366	Forgings, including tube sheets, and wrought pipe fittings
NACE MR0175 / ISO 15156	Sour service, 35 HRC maximum in the annealed condition
BS 3072 NA16 / BS 3073 NA16	British plate, sheet, and strip standards
DIN 17750 · DIN 17744	German wrought nickel-alloy flat-product standard, and the German general wrought nickel standard
ISO 6208 · VdTÜV 432	ISO plate, sheet, and strip; German pressure-vessel material data sheet
JIS NCF 825	Japanese designation
UNS N08825 / W.Nr. 2.4858 / NiCr21Mo	Material designations

No aerospace material specification reaches this grade, so flat product ships against ASTM B424 with B906 underneath it. Service ceiling: about 540 °C (1000 °F) in continuous service, above which phase formation lowers ductility and impact strength. ASME Section VIII allowables stop at 800 °F (427 °C). NACE MR0175 / ISO 15156 lists the grade in the solution-annealed condition at 35 HRC maximum. Flat product takes a final anneal at 1700–1800 °F (930–980 °C) followed by a rapid air cool or a water quench, and the rolled minima rest on that treatment.

Typical Supply Dimensions

Product Form	Thickness	Width	Length
Hot-rolled plate	4.76–100 mm	Up to 2000 mm	Up to 6000 mm, or cut to size
Cold-rolled plate	4.76–20 mm	Up to 1500 mm	Up to 6000 mm, or cut to size
Hot-rolled sheet	1.5–4.76 mm	600–1500 mm	Coil, or cut to length
Cold-rolled sheet	0.5–4.76 mm	600–1500 mm	Coil, or cut to length
Cold-rolled strip	0.1–4.76 mm	10–600 mm	Coil, or cut to length
Plate cut to size	4.76–100 mm	Per blank drawing	Per blank drawing
Circular blanks	4.76–100 mm	Up to 2000 mm dia.	Per blank drawing

Cut-to-size and profiled plate carries the heat number on every piece, and circular blanks are cut with the grain direction stated where the drawing calls for it.

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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