

SOUTHERLY ALLOY

Nickel 200 / Nickel 201 Pipe and Tube | UNS N02200 / N02201 | Werkstoff Nr. 2.4066 / 2.4068

ASTM B161 / B163 / B725 / B730 — Seamless and Welded Tubular Product

Product Description

Nickel 200 and Nickel 201 pipe and tube carry caustic and reducing media while conducting heat and current through the wall. ASTM B161 covers seamless pipe and tube, and B163 covers condenser and heat-exchanger tube with its own elongation and flare requirements. Above 315 °C, steam and hot process lines call for grade 201, because grade 200 releases graphite along its grain boundaries over time.

Chemical Composition

Element	Nickel 200 (UNS N02200)	Nickel 201 (UNS N02201)
Nickel (Ni), min.	99.0%	99.0%
Copper (Cu), max.	0.25%	0.25%
Iron (Fe), max.	0.40%	0.40%
Manganese (Mn), max.	0.35%	0.35%
Carbon (C), max.	0.15%	0.02%
Silicon (Si), max.	0.35%	0.35%
Sulfur (S), max.	0.01%	0.01%

Nickel is determined by difference and includes cobalt. The same composition table appears in ASTM B160, B161, B162, and B163.

Minimum Room-Temperature Mechanical Properties

Grade / Product / Condition	Tensile Strength, min.	Yield Strength (0.2%), min.	Elongation, min.
B161 seamless, grade 200, annealed, OD ≤ 127 mm (5 in.)	≥ 55 ksi (380 MPa)	≥ 15 ksi (105 MPa)	35%
B161 seamless, grade 200, annealed, OD over 127 mm (5 in.)	≥ 55 ksi (380 MPa)	≥ 12 ksi (80 MPa)	40%
B161 seamless, grade 200, stress-relieved, all sizes	≥ 65 ksi (450 MPa)	≥ 40 ksi (275 MPa)	15%
B161 seamless, grade 201, annealed, OD to 127 mm (5 in.)	≥ 50 ksi (345 MPa)	≥ 12 ksi (80 MPa)	35%
B161 seamless, grade 201, annealed, OD over 127 mm (5 in.)	≥ 50 ksi (345 MPa)	≥ 10 ksi (70 MPa)	40%
B161 seamless, grade 201, stress-relieved, all sizes	≥ 60 ksi (415 MPa)	≥ 30 ksi (205 MPa)	15%
B163 exchanger tube, grade 200, annealed	≥ 55 ksi (379 MPa)	≥ 15 ksi (103 MPa)	40%
B163 exchanger tube, grade 200, stress-relieved	≥ 65 ksi (448 MPa)	≥ 40 ksi (276 MPa)	15%
B161 converter tube, grade 200, full hard, OD ≤ 31.8 mm	≥ 95 ksi (655 MPa)	—	4%

Annealed tube carries a 70 HRB maximum hardness. B161 and B163 do not share one elongation figure, and B163 adds a flare test. The converter rows apply to thin-wall small-diameter tube alone, and neither standard covers tube below 3.2 mm outside diameter with a wall under 0.38 mm.

Physical Properties (typical values)

Property	Nickel 200 (N02200)	Nickel 201 (N02201)
Density	Approx. 8.89 g/cm ³	Approx. 8.89 g/cm ³
Melting range	Approx. 1435–1446 °C	Approx. 1435–1446 °C
Specific heat, 20 °C	Approx. 456 J/kg·K	Approx. 456 J/kg·K
Curie temperature	Approx. 360 °C (680 °F)	Approx. 360 °C (680 °F)
Modulus of elasticity	Approx. 205 GPa	Approx. 207 GPa
Thermal conductivity, 20 °C	Approx. 70.3 W/m·K	Approx. 79.3 W/m·K
Electrical resistivity, 20 °C	Approx. 0.096 μΩ·m	Approx. 0.085 μΩ·m
Thermal expansion, 20–100 °C	Approx. 13.3 μm/m·K	Approx. 13.2 μm/m·K
Poisson's ratio	Approx. 0.29	Approx. 0.29
Magnetic behaviour	Ferromagnetic at room temperature	Ferromagnetic at room temperature

Typical values for annealed material at room temperature, given for design work rather than acceptance testing. The two grades differ most in thermal conductivity and electrical resistivity.

Applicable Standards

Standard / Designation	Scope
ASTM B161 / ASME SB161	Seamless pipe and tube — UNS N02200 and N02201
ASTM B163 / ASME SB163	Seamless condenser and heat-exchanger tube
ASTM B725 / B730	Welded pipe and welded heat-exchanger tube
ASTM B751 / B775 / B829	General requirements for welded and seamless nickel pipe and tube
DIN 17751 / ISO 6207	Nickel seamless pipe and tube
BS 3074 (NA12) · VdTÜV 345	British tube standard; wrought nickel delivery conditions
JIS G 4902	Nickel and nickel alloy seamless pipe and tube

Examination follows the ordered document: hydrostatic testing on every length, with an approved electric test where the specification allows a substitution. Filler metal: ERNi-1 to AWS

A5.14, or ENi-1 to AWS A5.11. Interpass temperature stays below 150 °C. Service ceiling: ASME Section VIII Division 1 approves Nickel 200 to 600 °F (315 °C) and Nickel 201 to 1250 °F (677 °C). Above 315 °C, carbon leaves solution as graphite along the grain boundaries of grade 200, so continuous hot duty calls for grade 201. Grade 201 is sensitive to sulfide-bearing atmospheres above 315 °C, and wet hydrofluoric acid and oxidizing acids fall outside the envelope for both grades.

Typical Supply Dimensions

Product Form	Outside Diameter	Wall Thickness
Seamless pipe	6–219 mm	0.5–20 mm
Seamless heat-exchanger tube	10–426 mm	1.24–40.49 mm
Welded pipe	6–610 mm	1.0–20 mm
Welded heat-exchanger tube	10–426 mm	0.8–6.0 mm
Capillary and instrument tube	1.6–6.35 mm	0.2–1.0 mm
U-bend tube	10–51 mm	0.8–3.0 mm

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