SOUTHERLY ALLOY

Alloy 59 Pipe and Tube | UNS N06059 | Werkstoff Nr. 2.4605 | NiCr23Mo16Al | NS3311

ASTM B622 / B619 / B626 — Seamless and Welded Tubular Product

Product Description

Alloy 59 pipe and tube carries UNS N06059 in seamless, welded, and exchanger-tube form. ASTM B622 governs seamless product from 6 to 219 mm outside diameter, B619 covers welded pipe across Schedule 5S to XXS, and B626 covers welded tube from 3.2 to 88.9 mm. One heat serves acid coolers, scrubber piping, and pickling coils where the stream alternates between oxidising and reducing steps. Tubular product ships solution annealed and pickled, and welded routes usually enter service as welded because interpass temperature stays the only control point.

Chemical Composition

Element	Content (UNS N06059)	Element	Content (UNS N06059)
Nickel (Ni)	Balance	Chromium (Cr)	22.0–24.0%
Molybdenum (Mo)	15.0–16.5%	Iron (Fe)	1.5% max.
Aluminum (Al)	0.10–0.40%	Copper (Cu)	0.50% max.
Manganese (Mn)	0.50% max.	Cobalt (Co)	0.30% max.
Silicon (Si)	0.10% max.	Carbon (C)	0.010% max.
Phosphorus (P)	0.015% max.	Sulfur (S)	0.010% max.

Iron at 1.5% maximum and silicon at 0.10% maximum are the deliberate restraints behind the grade, and aluminium is the small deliberate addition. ASTM B574, B575, and B564 share this one composition table, so a single window governs every product form. The mill certificate governs final acceptance.

Minimum Room-Temperature Mechanical Properties

Standard / Form and Condition	Tensile Strength, min.	Yield Strength (0.2%), min.	Elongation, min.
Seamless tube, ASTM B622 – solution annealed	≥ 100 ksi (690 MPa)	≥ 45 ksi (310 MPa)	45%
Welded pipe, ASTM B619 – solution annealed	≥ 100 ksi (690 MPa)	≥ 45 ksi (310 MPa)	45%
Welded tube, ASTM B626 – solution annealed	≥ 100 ksi (690 MPa)	≥ 45 ksi (310 MPa)	45%

All three tubular documents carry the same acceptance minima for UNS N06059, so the form does not change the floor. ASTM B622 limits seamless product to 219 mm outside diameter on our range. Every route is water quenched from the anneal rather than cooled in air.

Physical Properties (typical values)

Property	Value
Density	Approx. 8.6 g/cm³
Melting range	Approx. 1310–1360 °C
Modulus of elasticity	Approx. 210 GPa
Thermal conductivity at 20 °C	Approx. 10.4 W/m·K
Electrical resistivity at 20 °C	Approx. 1.26 µΩ·m
Specific heat at 20 °C	Approx. 414 J/kg·K
Thermal expansion, 20–100 °C	Approx. 11.9 µm/m·°C
Relative magnetic permeability at 20 °C	1.001 max.
Strengthening route	Cold work only

Typical values published for the grade, intended for design work rather than acceptance testing. The alloy stays essentially non-magnetic, which suits instrument assemblies in acid duty. Cold work is the only route above the annealed floor.

Applicable Standards

Standard / Designation	Scope
ASTM B622 / ASME SB622	Seamless pipe and tube in the solution-annealed condition
ASTM B619 / ASME SB619	Welded pipe, Schedule 5S and heavier
ASTM B626 / ASME SB626	Welded tube and heat-exchanger tube
ASTM B829 / B775 / B751	General requirements for seamless tube, welded pipe, and welded tube
ASTM B366 / ASME SB366	Factory-made wrought fittings in the same grade
ASTM B574 / ASME SB574	Bar and rod in the same grade
ASTM B575 / ASME SB575	Plate, sheet, and strip in the same grade
NACE MR0175 / ISO 15156-3	Sour service qualification for oil and gas
DIN 17750 / 17751	Flat product and tube in the European system
VdTÜV 505	German pressure-equipment approval
UNS N06059 · W.Nr. 2.4605 · NiCr23Mo16Al · GB/T 15007 NS3311	Material designations
SAE AMS	No aerospace specification covers this grade

Alloy 59 has no aging response, so cold work sets every figure above the annealed floor, and welded joints usually enter service as welded. Solution annealing sits at 1100–1180 °C followed by a water quench, because the low silicon content makes secondary phases form quickly on a slow cool. Filler metal: ERNiCrMo-13 to AWS A5.14, or ENiCrMo-13 to AWS A5.11.

Typical Supply Dimensions

Product Form	Outside Diameter	Wall Thickness
Seamless pipe and tube, ASTM B622	6–219 mm	0.5–12.7 mm
Welded pipe, ASTM B619	Schedule 5S through XXS	Per schedule
Welded tube, ASTM B626	3.2–88.9 mm	0.41–3.7 mm
U-bend tube	As drawn, bent to drawing	0.7–6 mm
Instrument tube	3.2–25 mm	0.5–3 mm

Seamless sizes follow ASTM B622, and welded pipe follows the schedules ANSI B36.19 prints. Cut lengths carry the tolerance of the ordered condition.

Surface Finishes

Surface Condition	Typical Use
Solution annealed and pickled	Standard delivery for acid and chloride service
Bright annealed	Scale-free bore for instrument and clean circuits
Polished bore	Reduced roughness for product-contact tubing
Ground outside diameter	Tight tolerance for tube-to-tubesheet joints
Hot-finished	As-produced surface for lines that will be coated or lined
U-bent and stress relieved	Bundle form ready for exchanger assembly