

Alloy 59 Cold-Drawn Bar (UNS N06059 / W.Nr. 2.4605 / NiCr23Mo16Al) — Technical Data Sheet

Cold-Drawn Bar supplied to ASTM B574 and ASME SB574 — clause 1.2.3 opens a graded cold-worked route from 6.35 to 88.9 mm for UNS N06059 and only three other numbers, and the three printed levels reach 827, 931 and 1103 MPa tensile.

Chemical Composition — ASTM B574 limits, UNS N06059

Element	Content
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.
Phosphorus (P)	0.015% max.
Sulfur (S)	0.010% max.
Carbon (C)	0.010% max.

Minimum Mechanical Properties (ASTM B574 Table 3, cold worked)

Cold-Worked Grade (ASTM B574 Table 3)	Tensile Strength, min.	Yield Strength (0.2%), min.	Elongation, min.
Grade 1	≥827 MPa (120 ksi)	≥586 MPa (85 ksi)	20%
Grade 2	≥931 MPa (135 ksi)	≥862 MPa (125 ksi)	20%
Grade 3	≥1103 MPa (160 ksi)	≥1034 MPa (150 ksi)	15%

Physical Properties (Approx.)

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·K
Relative magnetic permeability at 20 °C	1.001 max.
Strengthening route	Cold work only

Standards and Designations

Standard	Product or Application
ASTM B574 / ASME SB574	Nickel-chromium-molybdenum rod and bar, solution annealed
ASTM B564 / ASME SB564	Forgings and forging stock above the bar window
NACE MR0175 / ISO 15156	Sour service, listed at the highest test level

Heat Treatment (solution anneal and release)

Condition	Typical Treatment
Solution Annealed	Held between 1100 °C and 1180 °C and water quenched, with about 1120 °C the preferred figure
Cooling Rate	Better than 150 °C per minute from the anneal down to about 500 °C, or grain-boundary phases form
Hot-Worked	Forged or rolled between 1180 °C and 950 °C, with heavy reduction taken at the top of that band
Cold-Drawn	Drawn after the anneal, in one of the three graded strength levels that Table 3 defines
Cold-Forming Limit	Deformation beyond 15% sends the section back through the final solution anneal before service
Stress-Relief Caution	A relief pass inside the precipitation band still costs corrosion resistance, so the alternative is settled before it is booked
Post-Weld Anneal	Most joints enter service as welded, because the low carbon and silicon levels keep the weld zone stable

Surface Finishes (Cold-Drawn Bar)

Surface Condition	Typical Use
Cold Drawn	Drawn stock holds a close diameter on this cold-drawn bar while the drawing pass lifts proof stress.
Centreless Ground	Grinding holds the diameter and the straightness of this cold-drawn bar for pump spindles and valve stems.
Peeled	A machined skin gives this cold-drawn bar an even diameter ahead of the finishing cut.

Typical Supply Dimensions — Cold-Drawn Bar

Product Form	Typical Supply	Length
Grade 1 Cold-Drawn Bar	827 MPa (120 ksi) tensile min., 586 MPa (85 ksi) yield min.	6.35–88.9 mm dia.
Grade 2 Cold-Drawn Bar	931 MPa (135 ksi) tensile min., 862 MPa (125 ksi) yield min.	6.35–88.9 mm dia.
Grade 3 Cold-Drawn Bar	1103 MPa (160 ksi) tensile min., 1034 MPa (150 ksi) yield min.	6.35–88.9 mm dia.
Ground Cold-Drawn Bar	Any grade, ground to the tight band of Table 2	6.35–88.9 mm dia.
Turned Cold-Drawn Bar	Any grade, turned to a uniform diameter	6.35–88.9 mm dia.
Custom Cold-Drawn Bar	Reduction and grade fixed to your drawing	Custom

ASTM B574 prints three mechanical columns for UNS N06059 and no hardness ceiling, so release rests on chemistry and tensile results. Values are for reference; the mill test certificate prevails for final acceptance.

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