SOUTHERLY ALLOY

Incoloy 800 / 800H / 800HT Bar and Rod | UNS N08800 / N08810 / N08811 | W.Nr. 1.4876 / 1.4958 / 1.4859

ASTM B408 / ASME SB408 — Iron-Nickel-Chromium Alloy Rod and Bar for High-Temperature Service

Product Description

Incoloy 800, 800H and 800HT are iron-nickel-chromium alloys supplied as bar and rod to ASTM B408, combining oxidation resistance, carburization resistance and controlled creep strength at elevated temperatures. UNS N08800 covers general high-temperature service, while the higher-carbon, grain-controlled N08810 and N08811 grades carry design values for long-term duty above 593 °C.

Chemical Composition (heat analysis per ASTM B408)

Element	Alloy 800 (N08800)	Alloy 800H (N08810)	Alloy 800HT (N08811)
Nickel (Ni)	30.0–35.0%	30.0–35.0%	30.0–35.0%
Chromium (Cr)	19.0–23.0%	19.0–23.0%	19.0–23.0%
Iron (Fe)	39.5% min.	39.5% min.	39.5% min.
Carbon (C)	0.10% max.	0.05–0.10%	0.06–0.10%
Aluminium (Al)	0.15–0.60%	0.15–0.60%	0.15–0.60%
Titanium (Ti)	0.15–0.60%	0.15–0.60%	0.15–0.60%
Aluminium + Titanium	—	—	0.85–1.20%
Copper (Cu), max.	0.75%	0.75%	0.75%
Manganese (Mn), max.	1.50%	1.50%	1.50%
Silicon (Si), max.	1.00%	1.00%	1.00%
Sulfur (S), max.	0.015%	0.015%	0.015%
Annealed grain size	Not specified	ASTM 5 or coarser	ASTM 5 or coarser

Carbon and the Al+Ti window are what separate the three grades; the mill test certificate governs final acceptance.

Mechanical Properties of Rods and Bars (minimum values, per ASTM B408)

Grade / Condition	Tensile Strength, min.	Yield Strength (0.2%), min.	Elongation, min.
N08800 — hot-worked, as-hot-worked	≥80 ksi (550 MPa)	≥35 ksi (240 MPa)	25%
N08800 — cold-worked and hot-worked, annealed	≥75 ksi (515 MPa)	≥30 ksi (205 MPa)	30%
N08810 / N08811 — cold-worked and hot-worked, annealed	≥65 ksi (450 MPa)	≥25 ksi (170 MPa)	30%

Forging-quality bar is furnished to chemical requirements and surface inspection only. Above about 593 °C the grades separate in creep-rupture strength, with 800HT highest.

Physical Properties (typical room-temperature values, common to the series)

Property	Value
Density	Approx. 7.94 g/cm³
Melting range	Approx. 1357–1385 °C
Modulus of elasticity	Approx. 196 GPa
Thermal conductivity at 20 °C	Approx. 11.5 W/m·K
Thermal expansion, 20–100 °C	Approx. 14.4 µm/m·K
Electrical resistivity at 20 °C	Approx. 0.989 µΩ·m
Curie temperature	Below –196 °C
Magnetic behaviour	Non-magnetic at ambient temperature

Grade Selection Guide

Selection Factor	Alloy 800	Alloy 800H	Alloy 800HT
UNS	N08800	N08810	N08811
Carbon window	0.10% max.	0.05–0.10%	0.06–0.10%
Al + Ti combined	0.30–1.20%	0.30–1.20%	0.85–1.20%
Solution anneal	Standard anneal	≥1121 °C, grain controlled	≥1121 °C, grain controlled
Typical bar duty	General service to about 593 °C	Creep-controlled service from 538 °C	Highest creep-rupture duty above 593 °C

Applicable Standards

Standard / Designation	Scope
ASTM B408	Nickel-iron-chromium alloy rod and bar — UNS N08800, N08810, N08811
ASME SB408	ASME edition for rod and bar
SAE AMS 5766	Alloy 800 bars, forgings and rings
W.Nr. 1.4876 / 1.4958 / 1.4859	European designations for the three grades
ASME Code Cases 1325 / 1987	Elevated-temperature design allowables for 800H and 800HT
JIS NCF 800 / NCF 800H / NCF 800HT	Japanese designations
EN 10095	Heat-resistant steels and nickel alloys
BS NA 15	British nickel-chromium-iron designation

Available Dimensions & Forms

Product Form	Typical Supply	Length
Round Bar	6–500 mm dia.	Cut to length or random
Round Rod	3–50 mm dia.	Cut to length
Bright Bar	6–150 mm dia.	Cut to length or random
Square Bar	10–150 mm	Cut to length or random
Hex Bar	10–150 mm A/F	Cut to length or random
Flat Bar	3–100 mm thick × 10–300 mm wide	Cut to length
Forged Bar	100–500 mm dia. or forged section	Cut to length
Precision-Ground Rod	3–100 mm dia., tight tolerance	Cut to length

Availability depends on grade, delivery condition and order quantity; tolerances follow ASTM B408 for the ordered condition.

Surface Finishes

Surface Condition	Typical Use
Solution annealed	Standard delivery condition for 800H and 800HT, setting the coarse-grain structure
Hot-worked (as-rolled)	Supplied as-worked for parts that will be machined to size
Cold drawn	Close diameter control with a brighter surface
Peeled	Machined skin with uniform diameter for further turning
Centreless ground	Tight diameter and straightness for precision components
Polished	Reduced roughness for visible or product-contact parts
Rough turned	Machining allowance held on large or forged bar