

309 is an austenitic heat resistant alloy with oxidation resistance to 1900°F under constant temperature conditions. When frequent thermal cycling is involved, the alloy is resistant to about 1850°F. The high chromium and relatively low nickel content of 309 provide good resistance to high temperature sulfur bearing atmospheres. 309 has only moderate resistance to carbon absorption and is not suggested for use in highly carburizing atmospheres.

Often in many product forms, the grain size and carbon content can meet both the 309S and 309H requirements. Prolonged exposure to the 1100-1600°F temperature range will cause some sigma to form, lowering room temperature ductility and impact resistance. Should sigma formation be anticipated, care should be taken to avoid heavy mechanical impact at room temperature. 309 has a machinability rating of 43% relative to AISI B1112 steel. Room temperature forming is suggested. Weld with AWS E309-16 covered electrodes or ER309 bare wire.

Specifications

UNS: S30908, S30909 W. Nr.: 1.4833 EN: 10095 ASTM: A 240, A 276, A 312, A 479 AMS: 5523
ASME: SA-240, SA-479, SA-312

Chemical Composition, %

	Cr	Ni	C	P	S	Mn	Fe
MIN	22.0	12.0	—	—	—	—	—
MAX	24.0	15.0	0.08	0.045	0.03	2.0	balance

Features

- Oxidation resistant to 1900°F
- Moderate strength at high temperature
- Ease of fabrication
- Good sulfidation resistance
- Good weldability

Applications

- Annealing covers and boxes
- Carbon saggars
- Waste incinerators
- Pulverized coal burners
- Brazing fixtures
- Lead pans, neutral salt pots
- Muffles, retorts
- Furnace fans and shafts
- Radiant tubes for aluminum and steel annealing
- Glass forming equipment
- Thermowells
- Paper mill equipment
- Power boiler tube hangers
- Rotary kilns and calciners
- Anchor bolts

Physical Properties

Density: 0.285 lb/in³ Melting Range: 2500 - 2590°F

Temperature, °F	70	1000	1200	1400	1600
Coefficient* of Thermal Expansion, in/in°F x 10 ⁻⁶	—	9.7	—	—	10.1
Thermal Conductivity Btu • ft/ft ² • hr • °F	7.4	11.5	12.4	—	—
Modulus of Elasticity Dynamic, psi x 10 ⁶	28.5	22.5	21.0	19.5	18.0

* 70°F to indicated temperature.

Mechanical Properties

Representative Tensile Properties

Temperature, °F	70	1200	1600
Ultimate Tensile Strength, ksi	90	52	18
0.2% Yield Strength, ksi	45	22	—
Elongation, %	50	26	32

Typical Creep-Rupture Properties

Temperature, °F	1200	1400	1600	1800
Minimum Creep 0.0001%/Hr, ksi	16	3.4	1.4	0.22
10,000 Hour Rupture Strength, ksi	17.2	4.8	1.6	0.56



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