

Excellent resistance to oxidation under mildly cyclic conditions through 2000°F characterizes 310. Because of its high chromium and medium nickel contents, 310 has good resistance to sulfidation and other forms of hot corrosion. 310 is widely used in moderately carburizing atmospheres such as encountered in petrochemical environments. The more severely carburizing atmospheres of industrial heat treating furnaces require RA330® or RA333®. 310 is not suggested for the severe thermal shock of repeated liquid quenching.

Often in many product forms, the grain size and carbon content can meet both the 310S and 310H requirements. 310 is often used at cryogenic temperatures, with excellent toughness to -450°F, and low magnetic permeability. 310 has a machinability rating of 42% relative to AISI B1112 steel. When using high speed steel tooling, this equates to about 70 surface feet per minute. Forming operations should be performed at room temperature whenever possible. Welding with AWS E310-15 electrodes or ER310 bare wire is suggested.

Specifications

UNS: S31008, S31009 W. Nr.: 1.4845 EN: 10095 ASTM: A 240, A 276, A 312, A 479 AMS: 5521, 5651
 ASME: SA-240, SA-479, SA-312

Chemical Composition, %

	Cr	Ni	C	Si	Mn	P	S	Mo	Cu	Fe
MIN	24.0	19.0	—	—	—	—	—	—	—	—
MAX	26.0	22.0	0.08	0.75*	2.0	0.045	0.03	0.75	0.5	balance

*ASTM specification 1.50 max Si.

Features

- Oxidation resistance to 2000°F
- Moderate strength at high temperature
- Resistance to hot corrosion
- Strength and toughness at cryogenic temperatures

Applications

- Flare tips
- Fluidized bed coal combustors
- Radiant tubes
- Tube hangers for petroleum refining and steam boilers
- Coal gasifier internal components
- Thermowells
- Refractory anchor bolts
- Burners, combustion chambers
- Retorts, muffles, annealing covers
- Food processing equipment
- Cryogenic structures

Physical Properties

Density: 0.284 lb/in³ Melting Range: 2470 - 2555°F

Temperature, °F	70	1000	1200	1400	1600	1800	2000
Coefficient* of Thermal Expansion, in/in°F x 10 ⁻⁶	—	9.5	9.8	10.05	10.15	10.3	10.6
Thermal Conductivity Btu • ft/ft ² • hr • °F	7.6	13.6	15.2	16.8	18.4	20.0	—
Modulus of Elasticity Dynamic, psi x 10 ⁶	29.0	23.0	21.8	20.5	19.2	—	—

* 70°F to indicated temperature.

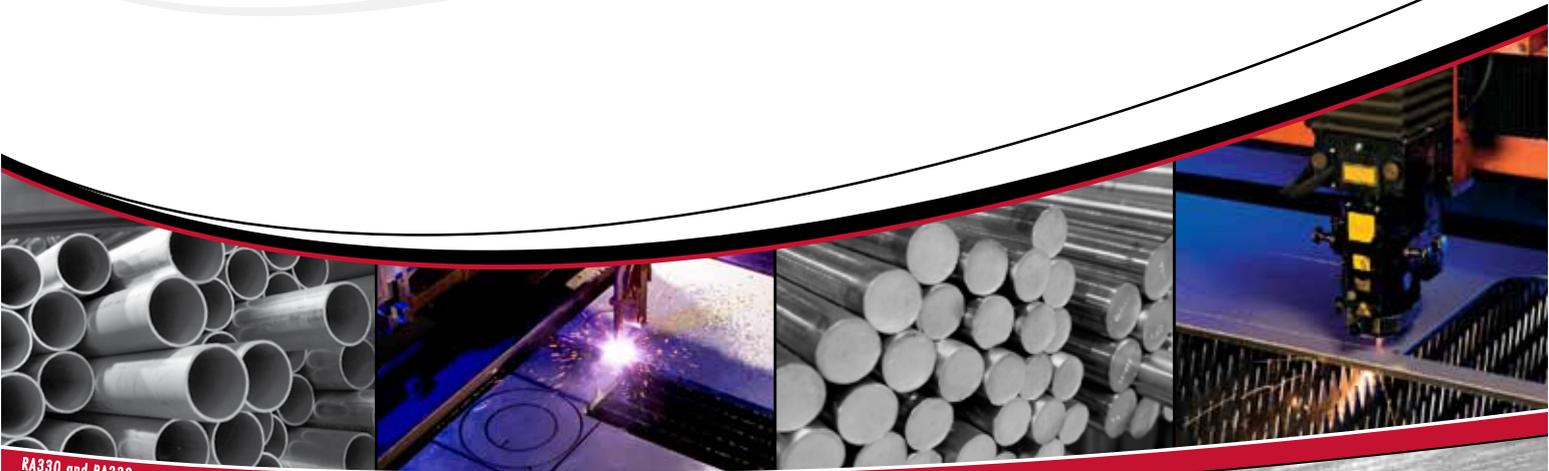
Mechanical Properties

Representative Tensile Properties

Temperature, °F	70	1000	1200	1400	1600
Ultimate Tensile Strength, ksi	80.0	67.8	54.1	35.1	19.1
0.2% Yield Strength, ksi	35.0	20.8	20.7	19.3	12.2
Elongation, %	52	47	43	46	48

Typical Creep-Rupture Properties

Temperature, °F	1200	1400	1600	1800
Minimum Creep 0.0001%/Hr, ksi	14.9	3.3	1.1	0.28
10,000 Hour Rupture Strength, ksi	14.4	4.5	1.5	0.66



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