

RA330® is the workhorse of the heat resistant alloys. It has good strength, carburization and oxidation resistance to 2100°F. These properties are enhanced by a nominal 1.25% silicon addition. RA330 has been designed to withstand the thermal shock of liquid quenching. RA330 finds wide application in high temperature industrial environments where good resistance to the combined effects of carburization and thermal cycling is a prime requisite. RA330 remains fully austenitic at all temperatures and is not subject to embrittlement from sigma formation.

RA330 is worked by forming and machining procedures similar to those used with the austenitic stainless steels or nickel-chromium alloys. Forming at room temperature is suggested whenever possible. Heat treatment is not necessary after most forming or welding operations. When required, the suggested full anneal is 1900-2050°F, rapid air cool or water quench. RA330 may be readily welded using RA330-04 weld fillers of matching composition. Do not use AWS ER330. Keep interpass temperatures low, do not preheat, do use reinforced stringer beads. Machinability rating 20-25% of B1112.

### Specifications

**UNS:** N08330 **W. Nr./EN:** 1.4886, 10095 **AMS:** 5592, 5716 **ASTM:** B 536, B 511, B 512, B 535, B 546, B 710, B 739  
**ASME:** SB-536, SB-511, SB-535, SB-710

### Chemical Composition, %

	Cr	Ni	Mn	Si	Cu	P	S	C	Fe
MIN	18.0	34.0	—	1.0	—	—	—	0.04	—
MAX	20.0	37.0	2.0	1.5	1.0	0.03	0.03	0.08	balance

### Features

- Oxidation resistant to 2100°F
- Resistant to carburization and nitriding
- Resistant to thermal shock
- Good strength at elevated temperature
- Metallurgical stability
- Chloride ion stress corrosion cracking resistance

### Applications

- Furnace containers-carburizing, carbonitriding, annealing malleablizing
- Muffles, retorts
- Bar frame heat treating baskets
- Quenching fixtures
- Radiant tubes
- Salt pots, both neutral and cyanide
- Furnace fans and shafts
- Conveyors
- Hot pressing platens
- Tube hangers for crude oil heaters and steam boilers

## Physical Properties

Density: 0.287 lb/in<sup>3</sup> Melting Range: 2450 - 2540°F

Temperature, °F	70	1400	1600	1800
Coefficient* of Thermal Expansion, (in/in°F x 10 <sup>-6</sup> )	—	9.7	9.8	10.0
Thermal Conductivity, Btu • ft/ft <sup>2</sup> • hr • °F	7.2	13.7	14.2	14.7
Modulus of Elasticity Dynamic, psi x 10 <sup>6</sup>	28.5	21.0	19.5	18.0

\* 70°F to indicated temperature.

## Mechanical Properties

## Typical Properties, Mill Annealed

Temperature, °F	70
Ultimate Tensile Strength, ksi	85.0
0.2% Yield Strength, ksi	39.0
Elongation, %	47
Reduction of Area, %	65
Hardness, Rockwell B	70-85
ASTM Grain Size	4-7
Erichsen Cup Depth, 0.025 in sheet	0.3937 in
Poisson's Ratio	0.297

## Short Time Elevated Temperature Tensile Properties

Temperature, °F	1000	1100	1200	1300	1400	1500	1600	1800	2000
Ultimate Tensile Strength, ksi	71	66.4	56.7	44.3	35.9	26.8	21.1	10.4	3.2
0.2% Yield Strength, ksi	25	24.2	22	21	20.7	17.3	15.4	8.5	2.0
Elongation, %	46	46	43	69	78	56	79	79	28

## Typical Creep-Rupture Properties

Temperature, °F	1400	1600	1800	2000
Minimum Creep Rate 0.0001%/hr, ksi	3.6	2.1	0.5	—
10,000 hr Rupture Strength, ksi	4.3	1.7	0.63	0.28



Exclusive Representative of Rolled Alloys®, Inc.

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