

446 is a high chromium ferritic heat resistant alloy with excellent resistance to oxidation, sulfidation and other forms of hot corrosion. This grade is most commonly used between 1500-2100°F, although its elevated temperature strength is quite low. 446 is the only heat resistant alloy that will tolerate molten copper and brass. As with other high chromium ferritic stainless, 446 embrittles severely in the 700-1000°F temperature range (885°F embrittlement). 446 should not be used in this temperature range unless nearly complete loss of room temperature ductility may be tolerated. Sigma phase embrittlement occurs upon long time exposure in the 1000-1300°F range.

446 has a high ductile-to-brittle impact transition temperature. Therefore, successful forming and bending is aided by low forming speeds, edge preparation and preheating to 250-400°F. Annealing, when necessary should be performed at 1550-1650°F followed by rapid cool.

Welding may be accomplished by conventional methods. Preheating and postheating to 300-600°F is helpful. Austenitic weld fillers, such as AWS E310 or E312 are generally suggested to maximize weld deposit ductility.

Specifications

UNS: S44600 W. Nr./EN: 1.4763 Similar ASTM: A 276, A 240

Chemical Composition, %

	Cr	C	N	Mn	Si	P	S	Fe
MIN	23.0	—	—	—	—	—	—	—
MAX	27.0	0.15	0.25	1.5	1.0	0.04	0.03	balance

Features

- Oxidation resistance through 2000°F
- Sulfidation resistance
- Good thermal conductivity
- Resistance to molten copper
- Low strength

Applications

- Neutral salt pot electrodes
- Recuperators
- Spouts for conveying molten copper alloys
- Oil burner parts
- Combustion chambers
- Furnace and kiln linings
- Stack dampers
- Boiler baffles
- Glass molds
- Soot blowers

Physical Properties

Density: 0.270 lb/in³ Melting Range: 2640 - 2710°F

Temperature, °F	70	1200	1400	1600	1800
Coefficient of Thermal Expansion* in/in°F x 10 ⁻⁶	—	6.3	6.4	6.7	7.3
Thermal Conductivity Btu • ft/ft ² • hr • °F	13.2	18.8	19.9	20.8	21.6
Modulus of Elasticity, Dynamic psi x 10 ⁶	30.4	20.0	—	—	—

* 70°F to indicated temperature.

Mechanical Properties

Representative Tensile Properties

Temperature, °F	70	1000	1100	1200	1300	1400
Ultimate Tensile Strength, ksi	68	52.7	27.7	15.0	10.5	5.0
0.2% Yield Strength, ksi	50	42.3	23	12	9.0	4.0
Elongation, %	30	27	65	90	113	128
Hardness, Rb	83 - 93	—	—	—	—	—

Typical Creep-Rupture Properties

Temperature, °F	1400	1600	1800
Minimum Creep 0.0001%/Hour, ksi	0.26	—	—
10,000 Hour Rupture Strength, ksi	1.1	0.45	0.23



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