



309
309S

Description

This grade possesses excellent resistance to oxidation as well as high tensile and creep strengths at elevated temperatures. It also provides excellent resistance to corrosive attack and exhibits the best performance of the 300 Series alloys in resistance to the attack of hot sulphur compounds in oxidizing gasses. Type 309 is used where high strength at elevated temperatures is of prime importance. Type 309s is used for welded components to improve corrosion resistance in the weld zone.

Typical Applications

- Exhaust manifold butterfly valves
- Annealing boxes
- Furnace parts
- Air draw furnace shafts
- Baffles
- Cement kiln chain
- Welding rods

Corrosion Resistance

Excellent resistance to wide range of chemical corrodents and industrial atmospheres. High resistance to sulphite liquors and acids such as acetic, citric, lactic, and nitric sulphuric mixtures.

Heat Resistance

Good resistance to oxidation in intermittent service up to 1850°F and in continuous service to 1950°F. Both grades operate best in relatively high constant temperatures with moderate, cyclic heating and cooling.

Heat Treatment

Annealing - heat to 1900-2050 °F and cool rapidly for maximum corrosion resistance. These grades cannot be hardened by thermal treatment.

Welding

Good characteristics suited to all standard methods. Type 309Cb electrodes and filler rods are generally used. Post-weld annealing normally not necessary because steel is generally in service at high temperatures.

| Chemical Analysis | | C | Mn | P | S | Si | Cr | Ni |
|-------------------|------|-----|-----|-------|------|-----|-----------|-----------|
| | 309 | .20 | 2.0 | 0.045 | 0.03 | 1.0 | 22.0-24.0 | 12.0-15.0 |
| Max values | 309S | .08 | 2.0 | 0.045 | 0.03 | 1.0 | 22.0-24.0 | 12.0-15.0 |

| Typical Mechanical Properties- Annealed | Yield Strength ksi | Tensile Strength ksi | Elongation % in 2" | Hardness | | Impact Charpy Ft. - lbs | Modulus of Elasticity in Tension - ksi |
|-----------------------------------------|-----------------------|-------------------------|-----------------------|----------|-----|----------------------------|----------------------------------------|
| | | | | R b | BHN | | |
| | 45 | 95 | 45 | 85 | 170 | 135 | 29000 |

| Other Properties | Creep Strength 1% flow 10,000 hours at 1000°F -ksi | Magnetic Permeability at 200H- Annealed | Electrical Resistivity - Microhm -Cm At 68°F | Coefficient of Thermal expansion: (ln/ln°F x 10 ⁻⁶) 32°- 212°F | Thermal Conductivity BTU/ft. ² /Hr./°F/ft. | |
|------------------|----------------------------------------------------------|--------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------|----------|
| | | | | | At 212°F | At 932°F |
| | 15.9 | 1.02 | 78 | 8.3 | 8.0 | 10.8 |

