

Alloy 600 is a nickel-based alloy with excellent carburization, and good oxidation resistance at elevated temperatures. The alloy has long been used in the heat treating industry for many of the same applications as RA330®. Alloy 600 has useful resistance to dry Cl<sub>2</sub> and HCl gases at moderately elevated temperatures. Alloy 600 is not suggested for use at red heat when sulfur is present due to its elevated nickel content.

Nickel grades 200 and 201 are normally preferred for handling concentrated, high temperature caustic. However, when sulfur compounds are present as well, or for ammonium hydroxide service, alloy 600 is suggested. Alloy 600 is subject to stress corrosion cracking in hot, concentrated caustic alkalies. To avoid stress corrosion cracking, the alloy 600 fabrication should be fully stress relieved prior to use. A minimum treatment of 1650°F for 1 hour is suggested, but 1800-1850°F for 1 hour preferred.

**Specifications**

UNS: N06600 W. Nr./EN: 2.4816 ASM: 5540, 5665 ASTM: B 168, B 166, B 167  
ASME: SB-168, SB-166, SB-167

**Chemical Composition, %**

|     | Ni   | Cr   | C    | Mn  | Cu  | Si  | S     | Fe   |
|-----|------|------|------|-----|-----|-----|-------|------|
| MIN | 72.0 | 14.0 | -    | -   | -   | -   | -     | 6.0  |
| MAX | -    | 17.0 | 0.15 | 1.0 | 0.5 | 0.5 | 0.015 | 10.0 |

\*ASTM specification 0.20 max C.

**Physical Properties**

Density: 0.304lb/in<sup>3</sup> Melting Range: 2470 - 2575°F Poisson's Ratio: 0.29 Electrical Resistivity: 620 Ohm-circ mil/ft

| Temperature, °F   | 70   | 1000 | 1200 | 1400 | 1600 | 1800 |
|---|------|------|------|------|------|------|
| Coefficient of Thermal Expansion*, in/in°F x 10 <sup>-6</sup> | -    | 8.4  | 8.6  | 8.7  | 9.1  | 9.3  |
| Thermal Conductivity Btu • ft/ft <sup>2</sup> • hr • °F       | 8.6  | 13.2 | 14.3 | 15.5 | 16.7 | -    |
| Modulus of Elasticity, Dynamic psi x 10 <sup>6</sup>          | 30.0 | 25.6 | 24.5 | 23.6 | 22.2 | 20.4 |

\*70°F to indicated temperature.

**Mechanical Properties**

Representative Tensile Properties

| Temperature, °F                | 70 | 1000 | 1200 | 1400 | 1600 | 1800 |
|--------------------------------|----|------|------|------|------|------|
| Ultimate Tensile Strength, ksi | 93 | 84   | 65   | 27.5 | 15   | 7.5  |
| 0.2% Yield Strength, ksi       | 37 | 28.5 | 26.5 | 17   | 9.0  | 4.0  |
| Charpy Impact V-notch, ft-lbs  | 45 | 47   | 39   | 46   | 80   | 118  |

**Static Corrosion in Molten Caustic Soda**

Corrosion Rate, Mills Per Year

| Temperature, °F | 750 | 932 | 1076 | 1256 |
|-----------------|-----|-----|------|------|
| Alloy 600       | 1.1 | 2.4 | 5.1  | 66.4 |
| Alloy 201       | 0.9 | 1.3 | 2.5  | 37.8 |
| Alloy 400       | 1.8 | 5.1 | 17.6 | -    |

**Features**

- Virtually immune to chloride ion stress corrosion cracking
- Good caustic corrosion resistance
- Resistant to dry Cl<sub>2</sub> to about 1000°F
- Oxidation resistance to 2000°F
- Carburization resistance

**Applications**

- Heat treating muffles and retorts
- Vacuum furnace fixtures
- Chlorination equipment to 1000°F
- Titanium dioxide plants

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