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## PRODUCT DATA SHEET

## INCONEL 600

## Nickel Alloys

UNS N06600

**Inconel 600** is a solid solution nickel chromium alloy for high temperature applications. Inconel 600 has good mechanical strength and can be used from cryogenic temperatures to 1200°C. It also has good corrosion resistance due to the high nickel content in combination with chromium.

### Chemical Composition (ASTM B166 - Bar (Annealed))

Element	%
Nickel	72.0 min
Chromium	14.0 - 17.0
Iron	6.00 - 10.0
Carbon	0.15 max
Manganese	1.00 max
Silicon	0.50 max
Sulphur	0.015 max
Copper	0.50 max

### Specified Minimum Properties (ASTM B166 - Bar (Annealed))

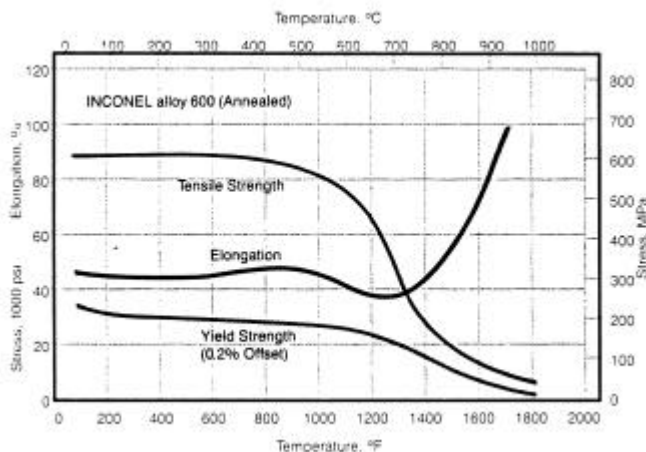
	Specified Minimum
Tensile Strength MPa	550
Yield Strength MPa	240
Elongation %	30

**Typical Applications:** Heat treating muffles and retorts, heat treating baskets, chlorination equipment to 540°C, pulp mill alkaline digesters. Other applications include heaters, stills, bubble towers, condensers for processing fatty acids, evaporator tubes, tube sheets and flaking trays for sodium sulphite manufacture, springs primary water pumping.

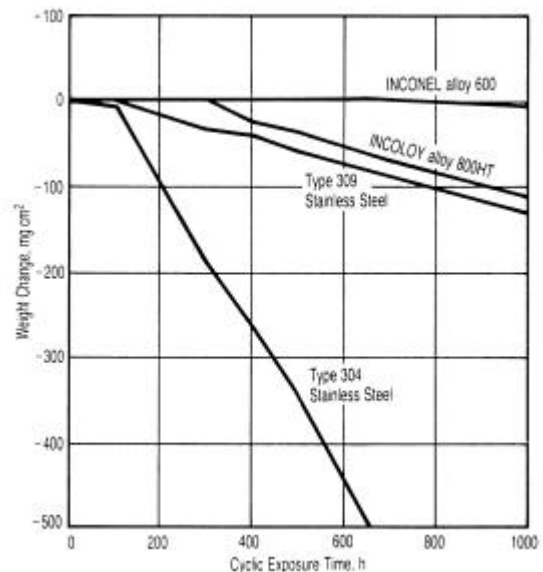
**Austral Wright Metals** can supply Inconel 600 as plate, sheet and strip, rod and bar, seamless and welded tube and pipe, welding fittings, forgings, forging billet, wire.

**High temperature applications:** Inconel 600 has excellent resistance to oxidation at high temperatures. It is the standard material for nitriding containers because of its resistance to nitrogen at high temperatures. It also has good resistance to carburisation. Inconel 600 will resist attack by sulphur compounds at moderate temperatures, but is subject to sulphidation at higher temperatures. Lubricants containing molybdenum disulphide should not be used above 425°C. Inconel 600 is not embrittled by long exposures at high temperature.

**Pressure vessels:** Inconel 600 is approved under AS1210 and ASME boiler and pressure vessel code Sections I (Code case 1827), III, VIII for temperatures up to 650°C.



Variation of tensile properties with temperature



Cyclic oxidation resistance of various alloys at 980°C.  
Each cycle was 15 minutes of heating, 5 minutes of air cooling.

**Physical Properties**

Property	at	value	unit	Property	at	value	unit
Density	20°C	8,470	kg/m <sup>3</sup>	Melting Range		1354 - 1413	°C
Modulus of Elasticity							
Tension	22°C	214	GPa	Specific Heat	20°C	444	J/kg.°C
Torsion	22°C	80.8	GPa	Coefficient of Expansion	20°C	10.4	x 10 <sup>-6</sup> /°C
Poisson's ratio	22°C	0.324		Thermal Conductivity	20°C	14.9	W/m . °C
Electrical Resistivity	20°C	1.03	micro-ohm . m				
Relative permeability	200 Oe	1.010		Curie Temperature		-192	°C

**Corrosion Resistance:** Inconel 600 has good corrosion resistance to many media. In feed water systems it is practically free of corrosion. It resists flowing sea water, but will corrode in stagnant sea water. The alloy has fair resistance to sulphuric acid at room temperature, but should not be used in this application at elevated temperatures. Resistance to hydrochloric acid is similar to sulphuric acid. The alloy has excellent resistance to phosphoric acid at room temperature in all concentrations, but is rapidly attacked at elevated temperature. Inconel 600 is practically free from chloride ion stress corrosion cracking. Please consult Austral Wright Metals for advice on your specific application.

**Oxidation Resistance:** Inconel 600 has good resistance to oxidation at high temperature. It outperforms all other alloys for resistance to nitridation in cracked ammonia. It should not be used in sulphur containing atmospheres at high temperature, particularly if the conditions are reducing. It resists dry chlorine and hydrochloric acid gas at moderate temperatures.

**Fabrication:** Inconel 600 can be hot forged. The surface should be clean before heating. Solution annealing after forging is normal. Inconel 600 is readily cold formed by standard processes and equipment. Work hardening in cold forming may require intermediate anneal.

**Machinability:** Inconel 600 is reasonably easy to machine (class "C" alloy). Heavy machines, sharp tools, slow speeds and deep cuts to remove the work hardened layer are needed.

**Welding:** Inconel 600 is readily welded by the SMAW (manual), GMAW (MIG), GTAW (TIG) and SAW processes. Preheat, post heat and post weld heat treatment are not needed. Contamination of the weld pool should be avoided. Inconel welding electrode 182 or Inconel filler metal 82 are normally used as welding consumables. Argon is used as the shielding gas.

**Welding Consumables**

	Normal Service	Higher Strength	Best Corrosion Resistance
Welding electrode	Inconel WE 182	Inconel WE 182	Inconel WE 182
Filler metal	Inconel FM 82	Inconel FM 82	Inconel FM 82
Flux cored wire	Inco Cored 82DH	Inco Cored 82DH	Inco Cored 82DH

**Heat Treatment:** Annealing at 1010°C for 15 minutes softens Inconel 600. Solution heat treatment is done at 1090 - 1150°C to dissolve carbides. Care should be taken with heat treatment as it affects corrosion resistance and high temperature properties.

**Equivalent Grade Designations**

Country	Body	Designation
France	AFNOR	NC 15 Fe
GB	BS	NA 14
Germany	DIN	2.4816
USA	UNS	N06600

**ASTM Product Specifications**

Specification	Title
B163	Seamless Nickel and Nickel Alloy Condenser and Heat-Exchanger Tubes
B166	Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06690, N06025, and N06045)* and Nickel-Chromium-Cobalt Molybdenum Alloy (UNS N06617) Rod, Bar, and Wire
B167	Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06690, N06025, and N06045)* Seamless Pipe and Tube
B168	Nickel-Chromium-Iron Alloys (UNS N06600, N06601, N06690, N06025, and N06045) and Nickel-Chromium-Cobalt Molybdenum Alloy (UNS N06617) Plate, Sheet, and Strip
B366	Factory-Made Wrought Nickel and Nickel Alloy Fittings
B516	Welded Nickel-Chromium-Iron Alloy (UNS N06600), UNS N06025, and UNS N06045 Tubes
B517	Welded Nickel-Chromium-Iron-Alloy (UNS N06600), UNS N06025, and UNS N06045 Pipe
B564	Nickel Alloy Forgings
B751	General Requirements for Nickel and Nickel Alloy Welded Tube
B775	General Requirements for Nickel and Nickel Alloy Welded Pipe