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PRODUCT DATA SHEET

INCONEL 601 UNS N06601

Nickel Alloys

Inconel 601 is a solid solution nickel chromium heat resisting alloy which gives outstanding performance at temperatures up to about 1200°C. Inconel 601 also has good aqueous corrosion resistance due to the high nickel content in combination with chromium. Strength and toughness are good, and are retained during extended service at high temperature.

Chemical Composition (ASTM B166 – Rod, bar & wire)

Element	%	Element	%
Nickel	58.0 - 63.0	Manganese	1.5 max
Chromium	21.0 - 25.0	Silicon	0.5 max
Iron	~ 16	Sulphur	0.015 max
Aluminium	1.0 - 1.7	Copper	1.0 max
Carbon	0.10 max		

Specified Minimum Properties (ASTM B166 - Bar - Annealed)

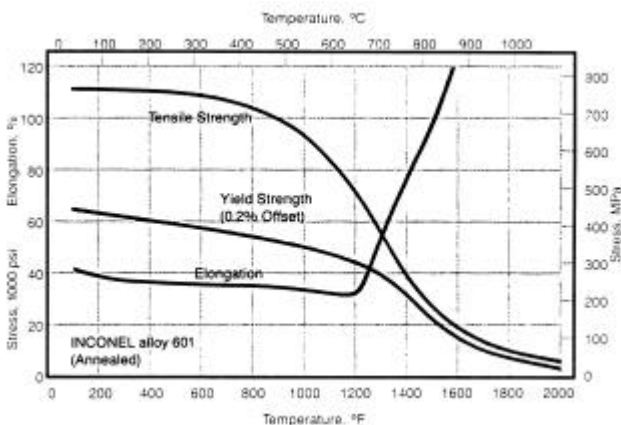
0.2 % Proof Stress MPa	Tensile Strength MPa	Elongation %
205	550	30

Typical Applications Thermal processing equipment - baskets, trays, fixtures, radiant tubes, muffles, retorts, flame shields, woven wire conveyers, burner nozzles and electrical resistance heating wires. Other applications include thermocouple protection tubes, process heaters, condenser tubes, catalyst supports in nitric acid manufacture, exhaust systems in gasoline engines and combustion chambers, superheater tube supports and ash handling in power generation.

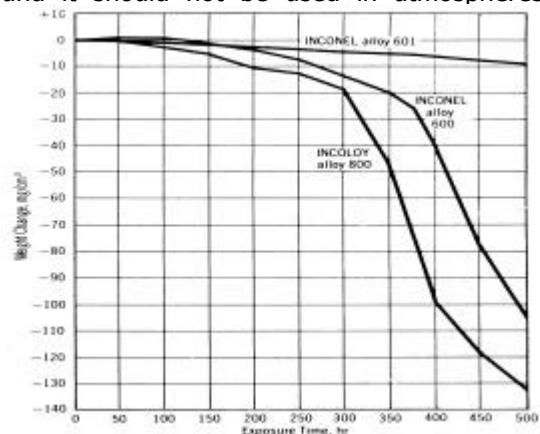
Description Inconel 601 is a solid solution nickel chromium alloy for high temperature heat resistance. It has excellent oxidation resistance. Inconel 601 also has good resistance to carburising but should not be used in atmospheres containing sulphur, particularly reducing sulphur. Inconel 601 has good resistance to nitriding in dissociated ammonia, and is only outperformed by Inconel 600 in this application. Inconel 601 has good strength, ductility and toughness, and can be used at cryogenic temperatures.

Austral Wright Metals can supply Inconel 601 as plate, sheet and strip, rod and bar, seamless tube and pipe, wire, forgings and forging stock.

Oxidation Resistance Inconel 601 has outstanding resistance to high temperature oxidation. It resists oxidation and spalling at temperatures as high as 1260°C. The protective oxide coating resists scaling even under severe conditions, and the alloy also has good resistance to carburisation and nitridation. Its resistance to sulphur is poor and it should not be used in atmospheres containing sulphur, particularly reducing sulphur.



Variation of tensile properties with temperature



Cyclic oxidation resistance of Inconel 601 at 1150°C
Each cycle was 50 hours at temperature, then air cooled to room temperature

Pressure Vessels Inconel 601 is qualified for use in pressure vessels in ASME Section VIII (Code case 1500) to 480°C. It is not pre qualified in AS1210.

Corrosion Resistance Inconel 601 has excellent corrosion resistance to the mineral acids, similar to Inconel 600. Inconel 601 has good resistance to sodium hydroxide solutions and because of the high nickel content good resistance to chloride stress corrosion cracking. As with austenitic stainless steels Inconel 601 can be sensitised to intergranular corrosion in some aggressive media after heating in the temperature range 540 - 760°C. Please consult Austral Wright Metals for your specific application.

Fabrication Inconel 601 is readily hot worked. Inconel 601 must be clean before heating is commenced and should not be heated in an atmosphere high in sulphur. This alloy can be cold formed similarly to austenitic stainless steel. Work hardening in cold forming may require intermediate annealing.

Machinability Inconel 601 as a 'C' class alloy is fairly difficult to machine. Heavy machines, sharp tools, slow speeds and deep cuts to remove the work hardened layer are needed.

Welding Inconel 601 is readily weldable by the SMAW (manual), GMAW (MIG), GTAW (TIG) and SAW processes. Preheat or post weld heat treatment are not needed. Care must be taken to avoid contamination of the weld pool. Argon is used as the shielding gas.

Welding Consumables

	Normal Service	Higher Strength	Best Corrosion Resistance
Welding electrode	Inconel WE 182	Inconel WE 117	N/A
Filler metal	Inconel FM 82	Inconel FM 617	Inconel FM 601
Flux cored wire	Inco Cored 82DH	N/A	N/A

Heat Treatment Inconel 601 is solution annealed at 1100 - 1180°C, and cooled quickly so as to avoid sensitisation to intergranular corrosion. Annealing time should be short to avoid excessive grain growth.

Physical Properties

Property	at	value	unit	Property	at	value	unit
Density	20°C	8,110	Kg/m ³	Electrical resistivity	20°C	1190	Micro.ohm /m
Melting Range		1360 - 1411	°C	Modulus of Elasticity			
Specific Heat	20°C	448	J/kg	Tension	20°C	207	GPa
Mean Coefficient of Expansion	20°C	13.8	X 10 ⁻⁶ / °C	Torsion	20°C	81.2	GPa
Thermal Conductivity	20°C	11.2	W/m °C	Poisson's ratio	20°C	0.272	
				Curie Temperature		-320	°C

Equivalent Specifications

Country	Body	Grade
USA	UNS	N06601
France	AFNOR	NC 23 FeA
GB	BS	-
Germany	DIN	2.4851

ASTM Product Specifications

Specification	Title
B166	Nickel Chromium Iron and Nickel Chromium Molybdenum Rod, Bar and Wire
B167	Nickel Chromium Iron Seamless Pipe
B168	Nickel Chromium Iron Alloys and Nickel Chromium Cobalt Molybdenum Alloy Plate, Sheet and Strip