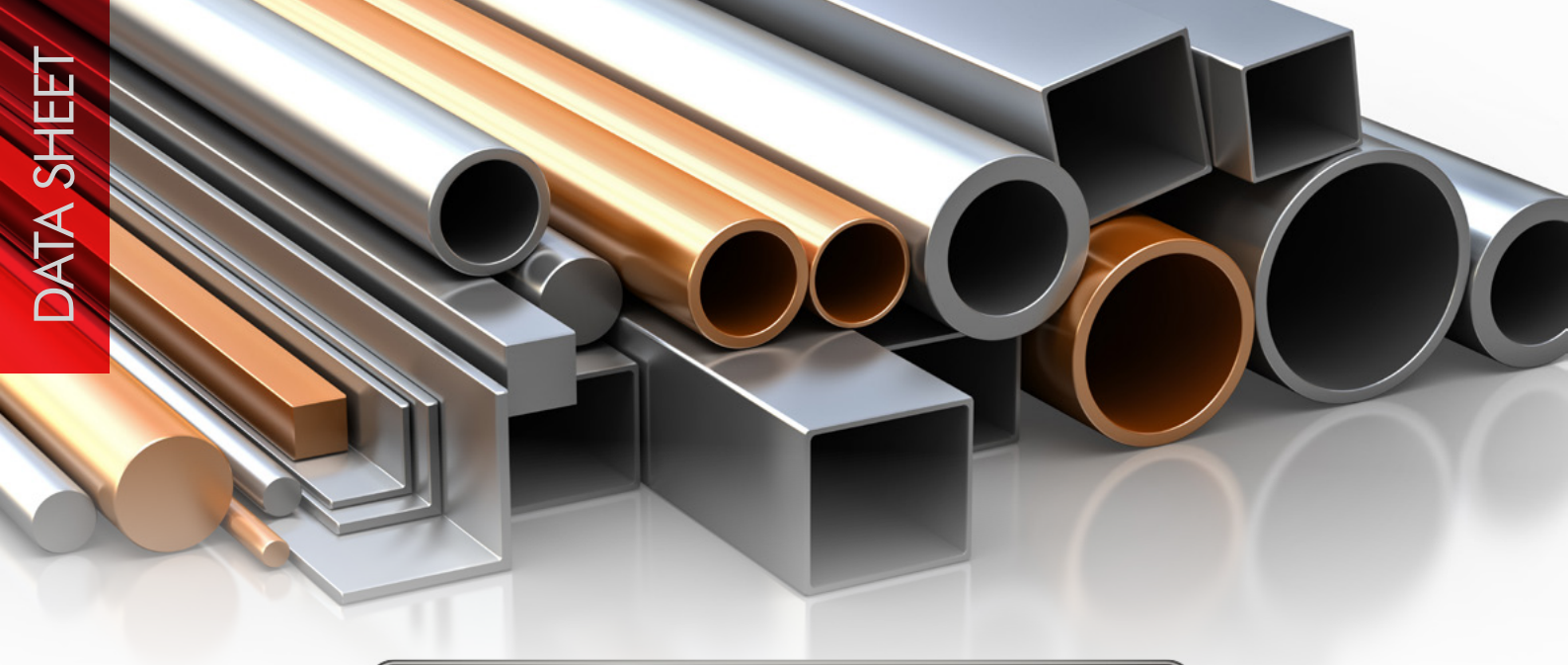
DATA SHEET



INCONEL® 600

UNS No - N06600

Other common names: Alloy 600

Inconel 600 is a nickel-chromium alloy utilized for applications that require corrosion as well as high temperature resistance. These nickel alloys was intended for service temperatures from cryogenic to high temperatures in the scope of 2000° F. It is non-magnetic, has phenomenal mechanical properties, and presents the alluring blend of high strength and very good weldability under an extensive scope of temperatures. The high nickel content in Inconel 600 enables it to hold extensive resistance under decreasing conditions, makes it resistant to corrosion by various organic and inorganic mixes and gives it magnificent resistance to chloride- ion stress-corrosion breaking furthermore gives magnificent resistance to alkaline solutions. Average utilizations of this nickel alloy incorporate the chemical, pulp and paper, aerospace, nuclear engineering and heat treating industries.

Applications

- Chemical industry
- Aerospace
- Heat treating industry
- Pulp and paper industry
- Food processing
- Nuclear Engineering
- Gas turbine components

Characteristics

- Resistant to a wide range of corrosive media.
- Virtually immune to chlorine ion stress corrosion cracking
- Non-magnetic
- Excellent mechanical properties
- High strength and good weldability under a wide range of temperatures

SUNMACH™
shaping exotic metals

INCONEL® 600

Corrosion Resistant

The composition of INCONEL alloy 600 enables it to oppose an assortment of corrosives. The chromium content of the alloy makes it better than industrially pure nickel under oxidizing conditions, and its high nickel content enables it to hold extensive resistance under decreasing conditions. The nickel content likewise gives magnificent resistance to alkaline solutions. The alloy has fair resistance to firmly oxidizing acid solutions. So the oxidizing impact of broke down the air alone is not adequate to guarantee complete resignation and opportunity from assault via air- saturated mineral acids and certain concentrated organic acids.

Fabrication

Alloy 600 can be both hot shaped and cold formed utilizing average process. Hot working should be performed within the scope of 1600° F and 2250° F maintaining a strategic distance from any work between1200-1600° F due to flexibility diminishes in this temperature range. Welding Alloy 600 can be accomplished through protected shielded metal-arc welding, TIG, and MIG.

Machining

Standard machining methods utilized for iron based alloys might be utilized. This alloy works harden during machining and has higher strength and “gumminess” not typical of steels. Heavy duty machining equipment as well as tooling should be utilized to minimize chatter or work-hardening of the alloy in front of the cutting. Most any business coolant might be utilized as a part of the machining operations. Water-base coolants are favored for high speed operations, for example, turning, grinding or milling. Heavy lubricants work best for tapping, drilling, broaching or boring. Turning: Carbide tool is recommended for turning with a nonstop cut. High speed steel tooling should be utilized for interfering with slices and for smooth completing to close resilience. Tools should have a positive rake angle. Cutting speeds and feeds are in the accompanying reaches: For High-Speed Steel Tools For Carbide Tooling Depth Surface Feed Depth Surface Feed of cut pace in inches of cut rate in inches feet/min. per rev. Inches feet/min. per rev. 0.250” 25-35 0.030 0.250” 150-200 0.020 0.050” 50-60 0.010 0.050” 325-375 0.008 Drilling: Steady feed rates must be utilized to maintain a strategic distance from work hardening because of harping of the drill on the metal. Rigid setups are crucial with as short a stub drill as practical. Heavy duty, high speed steel drills with heavy web is recommended. Feeds fluctuate from 0.0007 inches for each rev. for holes of less than 1/16” measurement, 0.003 inches for each rev. for 1/4” dia., to 0.010 inches for each rev. for holes of 7/8”diameter. Processing: To acquire great exactness and a smooth completion, it is fundamental to have unbending machines and fixtures and sharp cutting devices. High speed steel cutters, for example, M-2 or M-10 work best with cutting speeds of 30 to 40 feet per minute and feed of 0.004”- 0.006” per cutting tooth. Grinding: The alloy should be wet ground and aluminium oxide wheels or belts are favored.

Forming

This alloy has good ductility and might be promptly formed by every standard technique. Since the alloy is more powerful than consistent steel it need more power to perform forming. Heavy-duty lubricants should be utilized during cold forming. It is crucial to altogether clean the part of all traces of lubricant to shaping as embrittlement of the alloy might occur at high temperatures if lubricant is left on.

INCONEL® 600

Welding

The usually utilized welding strategies work well with this alloy. The coordinating alloy filler metal should be utilized. In the event that coordinating alloy is not available, then the closest alloy richer in the essential chemistry (Ni, Co, Cr and Mo) should be utilized. All welds dots should be marginally curved. It is not important to utilize preheating. Surfaces to be welded must be perfect and free from oil, paint or crayon marking. The cleaned area should stretch out no less than 2" past either side of a welded joint. Gas-Tungsten Arc Welding: DC straight polarity (electrode negative) is recommended. Keep as short an arc length as could be expected under the circumstances and use consideration to keep the hot end of filler metal dependably inside of the protected environment. Shielded Metal-Arc Welding: Electrodes should be kept in dry storage and if dampness has been grabbing the electrodes should be prepared at 600 F for one hour to safeguard dryness. Current settings shift from 60 amps for material (0.062" thick) up to 140 amps for material of 1/2" and thicker. It is best to weave the electrode marginally as this alloy weld metal does not tend to spread.
Cleaning of slag is finished with a wire brush (hand or powered). Complete evacuation of all slag is essential before progressive weld passes furthermore after final welding. Gas Metal-Arc Welding: Reverse-polarity DC should be utilized and best results are acquired with the welding weapon at 90 degrees to the joint. For Short-Circuiting-Transfer GMAW a typical voltage is 20-23 with a current of 110-130 amps and a wire feed of 250-275 inches per minute. For Spray-Transfer GMAW voltage of 26 to 33 and current in the scope of 175-300 amps with wire feed rate of 200-350 inches per minute, relying on filler wire diameter. Submerged-Arc Welding: Matching filler metal, the same concerning GMAW, should be utilized. DC current with either turn around or straight polarity might be utilized. Convex weld globules are favored.

Heat Treatment

Solution anneal at 1850 F for 15 minutes at temperature and air cool.

Forging

Forging might be done in the temperature scope of 2250 F to 1900 F.

Hot Working

The hot work temperature scope is 2250 F to 1600 F. The alloy has low ductility within the scope of 1200 F to 1600 F and working in that temperature scope should be avoided.

Cold Working

Cold forming might be done utilizing standard tooling albeit plain carbon tool steels are not recommended for shaping as they tend to produce galling. Soft die materials (bronze, zinc alloy, and so forth.) minimize galling and deliver great completions, yet the die life is to some degree short. For long production runs the alloy tool steels (D-2, D-3) and high speed steels (T-1, M-2, M-10) give great results particularly if hard chromium plated to decrease galling. Tooling should be, for example, to take into consideration liberal clearances and radii. Heavy duty lubricants should be utilized to minimize galling in all forming operations. Twisting of sheet or plate through 180 degrees is for the most part constrained to a twist sweep of 1 T for material up to 1/8" thick and 2 T for material thicker than 1/8".

Chemical Properties

C	Si	S	Cr	Mn	Fe	Ni	Cu
0.15 max	0.5 max	0.015 max	14.0 - 17.0	1.0 max	6.0 - 10.0	72.0 min	0.5 max

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Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
110	85	10

Physical Properties

Properties	Units	Temperature in °C
Density	8.47 g/cm^3	Room
Specific Heat	0.106 Kcal/kg.C	22°
Melting Range	1354 - 1413 °C	-
Modulus of Elasticity	214 KN/mm^2	22°
Electrical Resistivity	103 µΩ.cm	Room
Coefficient of Expansion	13.3 µm/m °C	20 - 100°
Thermal Conductivity	14.9 W/m -°K	20°

ASTM Specifications

Pipe (SMLS)	Pipe Welded	Tube (SMLS)	Tube Welded	Sheet / Plate	Bar	Forging	Fitting
B 167	B 517	B 163	B 516	B 168	B 166	B 564	B 366

Availability

MANUFACTURING
Fasteners
Custom Machining
Custom Fabrication
Piping / Spools
Stamped Parts
B/W Fittings
S/W Fittings
Flanges
Compression Fittings

RAW MATERIALS
Pipes
Tubes
Bars
Sheets
Plates
-
-
-
-

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