About Inconel 617/N06617

INCONEL alloy 617 (UNS N06617/W.Nr. 2.4663a) is a solid-solution, strengthened, nickel-chromium-cobaltmolybdenum alloy with an exceptional combination of high-temperature strength and oxidation resistance. The alloy also has excellent resistance to a wide range of corrosive environments, and it is readily formed and welded by conventional techniques.

The high nickel and chromium contents make the alloy resistant to a variety of both reducing and oxidizing media. The aluminum, in conjunction with the chromium, provides oxidation resistance at high temperatures. Solid-solution strengthening is imparted by the cobalt and molybdenum.

The combination of high strength and oxidation resistance at temperatures over 1800°F (980°C) makes INCONEL alloy 617 an attractive material for such components as ducting, combustion cans, and transition liners in both aircraft and land-based gas turbines. Because of its resistance to high-temperature corrosion, the alloy is used for catalyst-grid supports in the production of nitric acid, for heat-treating baskets, and for reduction boats in the refining of molybdenum.

Limiting Chemical Composition, %

Nickel..... 44.50 min.
Chromium..... .20.00-24.00
Cobalt.....10.00-15.00
Molybdenum 8.00-10.00
Aluminum 0.80-1.50
Carbon..... ....0.05-0.15
Iron..... ..3.00 max.
Manganese.....1.00 max.

Mechanical properties

INCONEL alloy 617 has high mechanical properties over a broad range of temperatures. One of the alloy’s outstanding characteristics is the strength level it maintains at elevated temperatures. The resistance of the alloy to high-temperature corrosion enhances the usefulness of its strength.

Tensile-properties

Typical Room-Temperature Mechanical Properties of Solution-Annealed Material								
Product Fom	**Production Method**	**Yield Strength (0.2%Offset**		**Tensile Strength**		**Elongation, %**	**Reduction of Area, %**	**Hardness BHN**
		ksi	**MPa**	**ksi**	**MPa**			
Plate	Hot Rolling	46.7	322	106.5	734	62	56	172
Bar	Hot Rolling	46.1	318	111.5	769	56	50	181
Tubing	Cold Drawing	55.6	383	110	758	56		193
Sheet or Strip	Cold Rolling	50.9	351	109.5	755	58		173

Corrosion Resistance

The composition of INCONEL alloy 617 includes substantial amounts of nickel, chromium, and aluminum for a high degree of resistance to oxidation and carburization at high temperatures. Those elements, along with the molybdenum content, also enable the alloy to withstand many wet corrosive environments. characteristics is the strength level it maintains at elevated temperatures. The resistance of the alloy to high-temperature corrosion enhances the usefulness of its strength.

Heat Treatment

INCONEL alloy 617 is a high-temperature resistant, mechanically superior, and corrosion-resistant alloy. Thermal treatment is a crucial step in optimizing the alloy's performance.

Solid solution treatment is an important step in the thermal treatment process of Inconel Alloy 617. At high temperatures, the alloy's grain structure changes to a coarse-grained austenite structure. Through solid solution treatment, this structure can be modified to improve mechanical properties.

The temperature for solid solution treatment typically ranges from 900°C to 1100°C, with a treatment time of 1-2 hours. During this process, the carbonitrides in the alloy gradually dissolve to form a single austenite structure. Additionally, the nitrogenides also dissolve, further improving the alloy's toughness.

Aging treatment is another essential step in the thermal treatment process of Inconel Alloy 617. Through controlled temperature and time, the carbonitrides and nitrogenides in the alloy reprecipitate, forming a strengthening precipitate phase. This precipitate phase significantly enhances the alloy's strength and hardness.
The temperature for aging treatment typically ranges from 600°C to 900°C, with a treatment time of 1-2 hours. During this process, it is essential to control the temperature and time to avoid excessive or insufficient precipitate phase formation, which can impact the alloy's performance.

Annealing treatment can eliminate internal stresses generated during the processing of Inconel Alloy 617 and improve its plasticity and corrosion resistance. The temperature for annealing treatment typically ranges from 900°C to 1000°C, with a treatment time of 1-2 hours. During this process, it is crucial to control the temperature and time to avoid excessive internal stress or structural changes.
The thermal treatment process of Inconel Alloy 617 is crucial for optimizing its performance. Through appropriate thermal treatment, the alloy's microstructure can be modified to enhance mechanical properties, toughness, and corrosion resistance. In practical applications, the optimal thermal treatment parameters should be selected based on specific service conditions and requirements to achieve the optimal performance of Inconel Alloy 617.

Available Forms

We provide you with a variety of product forms, including but not limited to

- Bar & Rod
- Pipe & Tube
- Coil & Strip
- Plate & Sheet & Circle
- Wire & Welding
- Fitting (Flange, Elbow, Tee...)
- Customize