

**S+D METALS**



**PROCESS INDUSTRY**

## Applications of nickel alloys

The chemical processing industry presents some of the most challenging high temperature and corrosive environments. Material selection is critical for safe and reliable operation. One of the key factors is corrosion resistance. Nickel alloys offer a combination of excellent corrosion resistance, high temperature strength and are readily fabricated and welded.

**ALLOY 625** has excellent resistance to severely corrosive environments combined with high strength – making it the work-horse of the chemical processing industry. It has good resistance to pitting and crevice corrosion and due to its high nickel content is resistant to chloride-induced stress corrosion cracking. ALLOY 625 finds application in the production and handling of sulphuric and phosphoric acids. It is readily fabricated into a wide variety of components such as fittings and flanges and special machined parts. Piping systems requiring fittings and flanges may also require expansion joints or compensators to absorb thermal expansion or vibration in the system. Being highly formable ALLOY 625 is ideally suited to sheet fabrications such as metal expansion joints. Also utilised in these applications is **ALLOY 625HP/625LCF** – a special variant of ALLOY 625 which is produced by vacuum melting and is specially processed to achieve a fine grain size. This gives the material increased ductility and enhanced low cycle fatigue resistance ALLOY 625HP/625LCF can offer a fatigue life up to 100 times that of conventional 625 which is desirable particularly in systems that are subjected to repeated thermal and mechanical cycling.

Due to its high nickel content **ALLOY 718** also has good resistance to stress corrosion cracking. Additions of chromium and molybdenum give resistance in many types of corrosive media. This alloy exhibits high resistance to chloride and sulphide stress corrosion cracking and to local corrosion such as pitting and crevice corrosion. We stock ALLOY 718 in the annealed condition (according to AMS 5662), in the fully precipitation treated condition (according to AMS 5663) and can source material to API standards depending on requirements. Machining in the fully heat treated condition improves the surface finish and dimensional stability whereas machining in the annealed condition offers optimum machinability and tool life. Parts can subsequently be precipitation heat treated to develop full strength.

**ALLOY 36** has good ductility and toughness at temperatures down to -250°C and a very low coefficient of thermal expansion which minimises any strains in the material due to thermal contraction. This makes ALLOY 36 ideal for cryogenic applications such as components in contact with liquified gases.

## Alloy Properties

	Specifications	Key attributes	Application
<b>ALLOY 625</b> N06625   2.4856	Bar: AMS 5666, ASTM B446, NACE MR-0175 Sheet/plate: AMS 5599, 5879	A Ni-Cr-Mo alloy with resistance to severely corrosive environments and with high strength from cryogenic temperatures to 815 °C	Fittings and flanges, chemical plant hardware, sea water service
<b>ALLOY 625HP   ALLOY 625LCF</b> N06626   2.4856	Sheet/strip AMS 5879	Special variant of ALLOY 625 with enhanced ductility and fatigue resistance	Expansion joints, compensator bellows, flexible couplings
<b>ALLOY 718</b> N07718   2.4668	Bar: AMS 5662 (annealed), AMS 5663 (aged), ASTM B637 Sheet/plate:AMS 5596 (annealed), ASTM B670	Combines high strength at temperatures up to 700 °C with excellent corrosion resistance	Valve body, stem, seat and other valve components, fasteners and bolting
<b>ALLOY 36</b> K93603   1.3912	Bar/sheet/plate: ASTM F1684	A binary iron-nickel (36%) alloy which has a low thermal expansion coefficient and good toughness at -250°C	Used for cryogenic service – liquid gases