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Nickel and Cobalt Alloys

High Temperature

These materials are designed to provide unique strength and/or corrosion properties at elevated temperatures. Major attributes include properties such as high strength, high creep resistance, resistance to softening, or resistance to metals loss at high temperature from oxidation, sulfidation, or carburization. Nickel content ranges from approximately 25% to 60%, with critical amounts of chromium, molybdenum, columbium and titanium.



Grade

End Use

- 600** Furnace parts, Heat treatment fixtures and restaurant cooking appliances
- 601** Heat treat baskets, Muffles and Retorts
- 625**
- 625 HP** Applications similar to 625 where extended fatigue life is desired, particularly at low cycle.
- 800,800H**
- 800AT** Process piping, Heat treat fixtures and Furnace parts
- 263** Land based gas turbines
- 718, 722**
- X750** Jet engine nacelles, Engine plumbing, Aircraft ducting, Recuperators and Trust

Electric

Soft Magnetic - Controlled Expansion - The thermal expansion characteristics of this group are used in several ways. For glass-to-metal sealing applications, the thermal expansion characteristics of glass and metal are closely matched and the metal must also have an oxide which fluxes at high temperature with the glass to provide a hermetic and mechanically sound joint. The most common applications are attachment of metallic parts to the internal of TV and cathode ray tubes, and also certain lamp bulb bases.

Grade

End Use

- 36** Controlled Expansion: Liquefied gas storage, Bimetallic strips for thermometers, LNG, TV Aperture masks, Composite wing molds.
- 42** Controlled Expansion: Lead frames, Color TB electron guns, Glass-metal and ceramic-metal seals, Transistors
- 4750** Soft Magnetic: Magnetic relay parts, Magnetic shielding, Pole pieces, Specialty motor stators and rotors, Electric Transformers and Magnetic amplifiers.
- Moly Permalloy** Soft Magnetic: Cores and relay components for high sensitivity ground fault circuit

breakers, Magnetic shields and Electric transformers

Corrosion Resistant

These alloys are intended for applications in the chemical processing, petroleum refining, marine, heat treating, pollution and waste control industries where common 200, 300 and 400 Series stainless may not provide adequate corrosion protection. The Corrosion Resistant Materials may be grouped as follows:

Grade

End Use

- 200/201** Containers and Piping
- 22** Flue-gas desulphurization systems, Waste incinerators, and Sour Gas service
- 276** Pipe, tube for aggressive chloride environments
- 400** Pumps, Valves and Fittings
- 825** Pollution control and Radioactive waste equipment, Chemical transportation and acid production equipment, Pickling equipment, Oil/Gas well piping.
- ALLCORR®** Highly aggressive acidic chloride environments



Titanium

Commercially Pure Grades & Alloyed

The combination of high strength-to-weight ratio, excellent mechanical properties, and corrosion resistance makes titanium the best material choice for many critical applications. Today, titanium alloys are used for demanding applications such as static and rotating gas turbine engine components. Some of the most critical and highly-stressed civilian and military airframe parts are made of these alloys...

Grades 1, 2, 3, 4, 7, 11, and 12 are considered 'unalloyed' titanium and have similar mechanical properties. Grades 1 through 4 allow increasing levels of impurities. Grades 7 and 11 have 0.2% palladium added to improve titanium's already excellent corrosion resistance. Grade 12 features 0.8% Ni and 0.3% Mo to improve the corrosion resistance at a lower cost than Pd. Titanium alloys generally feature higher strength than unalloyed titanium.

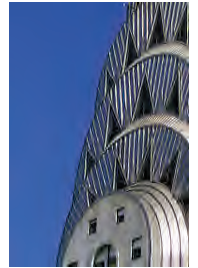
Alloys Ti-5Al-2Sn-2Zr-4Mo-4Cr (commonly called Ti-17) and **Ti-6Al-2Sn-4Zr-6Mo** for high strength in heavy sections at elevated temperatures.

Alloys Ti-6242S, IMI 829, and Ti-6242 (Ti-6Al-2Sn-4Zr-2Mo) for creep resistance

Alloys Ti-6Al-2Nb-1Ta-1Mo and Ti-6Al-4V-ELI are designed both to resist stress corrosion in aqueous salt solutions and for high fracture toughness. **Ti-6Al-4V** alpha-beta alloy. This alloy is well understood and is also very tolerant on variations in fabrication operations. **Alloy Ti-5Al-2,5Sn** is designed for weldability, and the ELI grade is used extensively for cryogenic applications. **Alloys Ti-6Al-6V-2Sn, Ti-6Al-4V and Ti-10V-2Fe-3Al** for high strength at low-to-moderate temperatures

Stainless Steels

Grades of steel with more than 10% chromium and often with other alloying elements to resist corrosion, vary strength characteristics, and facilitate fabrication into parts.



Grade

End Use

A-286 alloy is a heat and corrosion resistant austenitic ironbase material which can be age hardened to a high strength level. The alloy is also used for low temperature applications requiring a ductile, non-magnetic high strength material at temperatures ranging from above room temperature down to at least -320°F (-196°C). The alloy may be used for moderate corrosion applications in aqueous solutions.

Custom 450 This stainless can be machined, hot-worked, and cold-formed in the same manner as other martensitic age-hardenable stainless steels. A particular advantage is ease of welding and brazing. Custom 450 stainless is generally supplied in the annealed condition, requiring no heat treatment by the user for many applications. Because it has corrosion resistance like Type 304 stainless but three times the yield strength, it has been used in applications where Type 304 was not strong enough. On the other hand, it has also replaced Type 410 stainless directly on a strength basis where Type 410 had insufficient corrosion resistance.

Custom 455, 400 Series ferritic and martensitic chromium alloys, **300 Series** provides good strength and ductility when cold worked. It also has excellent corrosion resistance properties. **301** stainless steel is well suited to welding and forming and drawing. **17-4** One of the most widely used precipitation hardening grades in the business. While soft and ductile in the solution annealed condition, it is capable of high properties with a single precipitation or aging treatment. Characterized by good corrosion resistance, high hardness, toughness and strength. **17-7 PH** is a precipitation-hardening stainless steel that provides high strength and hardness, excellent fatigue properties, good corrosion resistance and minimum distortion on heat treatment. **15-5** is a precipitation hardening martensitic stainless steel. It is used in applications requiring better corrosion resistance and transverse properties compared to other similar martensitic grades. Strength and toughness desired can be altered by temperate range in the heat treatment process. **15-7** This alloy is particularly beneficial for a wide range of applications that include retaining rings, springs, diaphragms, aircraft bulkheads, welded and brazed honey comb paneling and other aircraft components requiring high strength at elevated temperatures. **13-8 PH** a precipitation hardening stainless steel employed for its scalding and corrosion resistant properties.

Greek Ascoloy and many other grades