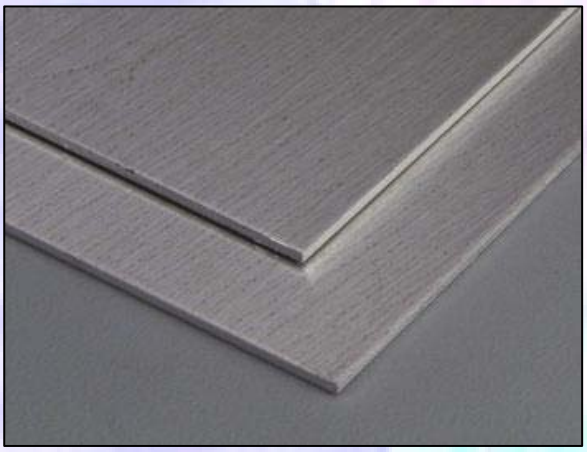

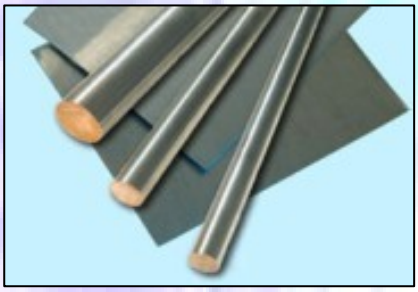

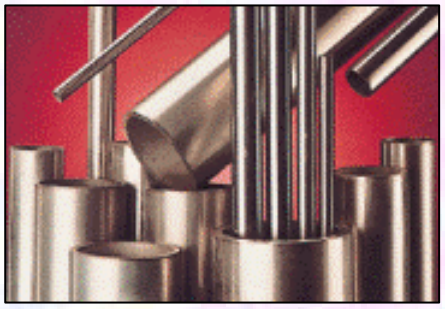

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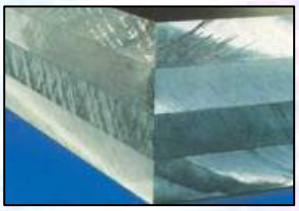


Aluminum

Aluminium alloys are alloys in which aluminum is the predominant metal. Aluminum 6061 is a heat-treatable grade widely used in light to medium strength structural applications. The alloy has good corrosion resistance and weldability and possesses good formability in the 0 to T4 tempers. 6061 does lose appreciable strength when welded and it is replaced by the 5000 series alloys where afterweld strength is a prime consideration. 6061 is used in structural areas where both strength and corrosion resistance is required, truck bodies and frames, and towers. Wrought and cast aluminium alloys use different identification systems. Wrought aluminium is identified with a four digit number which identifies the alloying elements. Cast aluminium alloys use a four to five digit number with a decimal point. The digit in the hundreds place indicates the alloying elements, while the digit after the decimal point indicates the form (cast shape or ingot). The temper designation follows the cast or wrought designation number with a dash, a letter, and potentially a one to three digit number, e.g. 6061-T6. T6 = Solution heat treated and artificially aged.

Brass

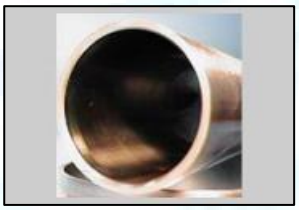
Brass is the generic term for a range of copper-zinc alloys with differing combinations of properties, including strength, machinability, ductility, wear-resistance, hardness, color, antimicrobial, electrical and thermal conductivity, and corrosion-resistance. This material produces a good finish appearance, and welds well with proper equipment.. Brasses set the standard by which the machinability of other materials is judged and are also available in a very wide variety of product forms and sizes to allow minimum machining to finished dimensions. Brass does not become brittle at low temperatures like mild steel. Brass also has excellent thermal conductivity making it a first choice for heat exchangers (radiators). Its electrical conductivity ranges from 23 to 44% that of pure copper.

Bronze

Bronze is produced in a wide variety of grades for various applications.
C22000 (Commercial Bronze)This copper-zinc alloy has excellent cold working properties for spinning and drawing. it is stronger and harder than copper and has good resistance against stress corrosion or season cracking. it is excellent for outdoor service such as lighting fixtures, weather stripping, kick and push plates. **Other Grades include: C38500** - (Architectural Bronze), **C46400** - (Naval Bronze), **C51000** - (Phosphor Bronze), **C61400** - (Aluminum Bronze Sheet/Plate), **C63000** - (Aluminum Nickel Bronze), **C64200** - (Aluminum Bronze Rod), **C65500** - (Silicon Bronze), **C67500** - (Manganese Bronze), **C93200** - (SAE 660 Bearing Bronze), **SAE 841** - (Solid Sintered Bearing Bronze Bars)

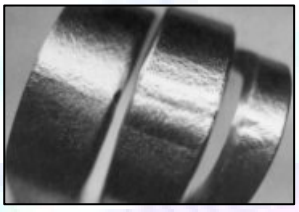
Copper

Grade C11000 - Electrolytic Tough Pitch Copper has long been the standard type of commercial wrought copper used for the production of wire, rod, plate, sheet and strip. The presence of very small amounts of oxygen affects some of the mechanical properties to a measurable extent, but this grade of copper is entirely satisfactory for most of the usual processes. It is easy to deep draw, spin, or stamp. It is the logical choice for bus connections, switch and panel boards, circuit breakers, and power feed systems in general, because of high electrical conductivity, ease of soft or silver soldering and ability to receive a silver plate. Expansion joints, kettles, vats, pressure vessels, distillery and other process equipment are readily formed from the metal. Its resistance to corrosion assures a long life. For welding and high temperature applications see Deoxidized Copper and Oxygen Free Copper. **Other Grades Include: C10100** - Oxygen-Free Electronic Grade Copper is the highest grade of copper at 99.99% purity. **C10200** - Oxygen-Free High Conductivity Copper **C12200** - Deoxidized Copper



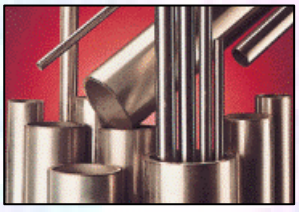
Hastelloy® C-276

Hastelloy® C-276® is a wrought corrosion-resistant alloy. A prime advantage of this alloy is that it generally does not require solution heat treatment after welding. Hastelloy resists the formation of grain boundary precipitates that would degrade corrosion resistance. Alloy C-276 offers improved fabricability over the similarly corrosion-resistant Alloy C. Conventional methods can be used to hot work and cold form Alloy C-276, and typical welding techniques are appropriate. Resistant to forming grain boundary precipitates in the weld-affected zone, Alloy C-276 is appropriate in the as-welded condition for many chemical processes. Other benefits include resistance to pitting, stress-corrosion cracking and oxidation to 1900° F (1038° C).



Haynes 242 Alloy

Haynes® 242 alloy is an age-hardenable nickel-molybdenum-chromium alloy which derives its strength from a long-range-ordering reaction upon aging. It has tensile and creep strength properties up to 1300°F (705°C) which are as much as double those for solid solution strengthened alloys, but with high ductility in the aged condition. The thermal expansion characteristics of 242 alloy are much lower than those for most other alloys, and it has very good oxidation resistance up to 1500°F (815°C). Other attractive features include excellent low cycle fatigue properties, very good thermal stability, and resistance to high-temperature fluorine and fluoride environments.



Inconel® - nickel-chromium iron

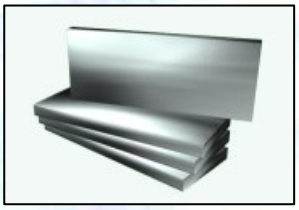
Inconel® refers to a family of trademarked high strength austenitic nickel-chromium-iron alloys that have exceptional anti-corrosion and heat-resistance properties. These alloys contain high levels of nickel and can be thought of as super-stainless steels. Inconel alloys are used for a variety of extreme applications including navy boat exhaust ducts, submarine propulsion motors, undersea cable sheathing, heat exchanger tubing and gas turbine shroud rings.

Invar 36 Alloy

Invar 36 is one of the controlled expansion alloys. It has an expansion rate roughly 10 % that of standard carbon steels. Also known as "Alloy E 36" or simply "Alloy 36", this amazing alloy is second only to Super Invar in having the lowest CTE available. Note: Recent testing has determined that increased hardness will decrease CTE in all temperature ranges in Invar alloys. Commonly employed in electronic equipment such as radios, laser systems, and thermostats. This alloy can be machined employing most common methods. It is known to produce "gummy" chips and is best machined at slow speeds with positive and constant feeds

Kovar Alloy

Kovar is an iron based alloy with nickel and cobalt. The chemistry is closely controlled so as to result in low, uniform, thermal expansion characteristic for the alloy. One of the primary uses for this alloy is for glass sealing of metal components, or lead wires, into hard glass or ceramic devices. It also finds use in applications where low expansion with temperature change is a desired characteristic, such as integrated circuit packaging.

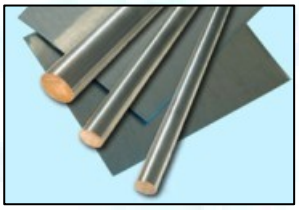


Molybdenum

Molybdenum is a silvery-white, hard, transition metal often confused with graphite and lead ore. Molybdenum is used in alloys, electrodes and catalysts. It is a transition metal with an electronegativity of 1.8 on the Pauling scale and an atomic mass of 95.9 g/mole. Molybdenum does not react with oxygen or water at room temperature. At elevated temperatures, molybdenum trioxide is formed in the reaction 2Mo + 3O2 ü¨ 2MoO3. In its pure metal form, molybdenum is silvery white with a Mohs hardness of 5.5, though it is somewhat more ductile than tungsten. It has a melting point of 2623üïC, and, of the naturally-occurring metals, only tantalum, osmium, rhenium, and tungsten have higher melting points. Molybdenum burns only at temperatures above 600üïC. It also has the lowest heating expansion of any commercially used metal.

Nickel 200, 201

Nickel 200 is commercially pure (99.6%) wrought nickel. It has good mechanical properties and excellent resistance to many corrosive environments. Other useful features of the alloy are its magnetic and magnetostrictive properties, high thermal and electrical conductivities, low gas content and low vapor pressure. The corrosion resistance of Nickel 200 makes it particularly useful for maintaining product purity in the handling of foods, synthetic fibers, and caustic alkalies; and also in structural applications where resistance to corrosion is a prime consideration. Other applications include chemical shipping drums, electrical and electronic parts, aerospace and missile components and rocket motor cases.

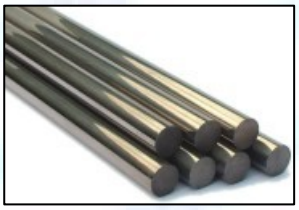


Tantalum and Ta-Alloys

As a high melting point metal, Ta possesses a low vapour pressure and good electrical and thermal conductivity up to very high temperature. The advantages of Ta are excellent corrosion resistance, high high-temperature strength, good machinability and good biocompatibility. Types include; Ta1, Ta2 FTa-1, FTa-2, R05255 R05252 R05240. Tantalum and Ta-Alloy are mainly used for Heat Exchangers, Shell and Tube Heaters, Bayonet Heaters, Condensers, vessel liners, Sputtering Targets, Cathode Protection Systems for steel structures such as bridges, water tanks, Corrosion Resistant Fasteners, High Temperature Furnace Parts, Nuclear Reactors, Aircraft and Missile Parts.

Titanium

Titanium is absolutely immune to environmental attack, regardless of pollutants. Where other metals exhibit limited lifespan, titanium endures. The specific gravity of titanium is 4.51 g /cm3 - about 60% that of steel, half that of copper and 1.7 times that of aluminum. In addition to having excellent mechanical strength (comparable to mild steel), titanium is durable and shock resistant. Its modulus of elasticity (a measure of strain rate) is half that of stainless steel. Titanium parts made by machining, casting and forging, include a variety of bolts, nuts, washers, flanges, connectors, elbows, medical parts which are widely used in motorcycle, bicycle, car, medical, aerospace, and petrochemical industrial applications.



Tungsten

Pure Tungsten has the highest melting point and lowest vapour pressure, and at temperatures over 1650 C has the highest tensile strength. The metal oxidises in air and must be protected at elevated temperatures. It has excellent corrosion resistance and is attacked only slightly by most mineral acids. It is remarkable for its robust physical properties, especially the fact that it has the highest melting point of all the non-alloyed metals and the second highest of all the elements after carbon. Tungsten is often brittle and hard to work in its raw state; however, if pure, it can be cut with a hacksaw. Tungsten is also the only metal from the third transition series that is known to occur in biomolecules. In its raw form, tungsten is a steel-gray metal that is often brittle and hard to work. But, if pure, it can be worked easily. It is worked by forging, drawing, extruding, or sintering. Of all metals in pure form, tungsten has the highest melting point (3,422 °C, 6,192 °F), lowest vapor pressure and (at temperatures above 1,650 °C) the highest tensile strength.[7] Tungsten has the lowest coefficient of thermal expansion of any pure metal. Alloying small quantities of tungsten with steel greatly increases its toughness.

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