Nickel-Chromium Alloy

	Name (Symbol)	General Characteristics of Nickel-Chromium, -Copper, -Iron Alloy	Applications
Electrical Resistance Alloy	Electrical Resistance Alloy Nichrome #1	High mechanical strength at temperature up to 1100°C, without losing anti-oxidation. Hard to become brittle after heating.	Wire, electrical resistors, used for heating elements in domestic appliances and industrial equipment.
	Electrical Resistance Alloy Nichrome #2	Electrical-Resistance alloy, CH-2 is a little inferior in strength to NCH-1, used in high operating temp. up to 1000°C.	Heating elements for Home-use and Industrial-use, increased for oxdation resistance
Heat resisting Alloy	Inconel 600 (I-600)	Exellent resistance to chloride-ion stress corrosion cracking, high corrosion resistance against pure water and alkaline.	Chemical and Food processing, thermal processing tools and equipments, nuclear reactors, electronic parts
	Inconel 601 (I-601)	Specially high resistance to oxidation and corrosion at high temperature with good mechanical strength in high temp.	Industrial furnaces, petrochemical and other process equipment; baskets, muffles, gas-turbine.
	Inconel 625 (I-625)	Ni-Cr-Mo, stiffen alloy's matrix, provide high strength without a heat treatment. resists a wide range of corrosive environments.	Chemical processing, aerospace and marine engineering, pollution-control equipment, and nuclear reactors.
	Inconel 718 (I-718)	High corrosion resistance along with tensile and creep-rupture properties at high temp. to 700°C. Good weldability of high resistance to postweld cracking.	Aircrafts, Gas turbines, rocket motors, space-craft, nuclear reactors, nuclear fuel spacer and spring.
	Inconel X750 (I-X750)	With good resistance to corrosion and oxidation along with high tensile and creep-rupture properties at temp. to 700°C.	Gas turbines, rocket engines, nuclear reactors, pressure vessels, tooling, and aircraft structures
	Incoloy 800 (I-800)	With significantly higher creep-rupture strength. The higher strength results from close control of the carbon, aluminum, and titanium contents in conjuncton with a high-temperature anneal.	Process piping, heat exchangers, carburizing equipment, heating-element sheathing, and nuclear steam-generator tubing.
	Incoloy 800HT/ 800H (I-800HT)	Process piping, heat exchangers, carburizing equipment, heating-element sheathing, and nuclear steam-generator tubing	Chemical and petrochemical processing, in power plants for super-heater and reheater tubing, in industrial furnaces, and for heat-treating equip.
	Hastelloy X (H-X)	Process piping, heat exchangers, carburizing equipment, heating-element sheathing, and nuclear steam-generator tubing	Gas turbines, Industrial furnaces, heat-treating equipment, and nuclear engineering.
	Nimonic 80A (N-80A)	Ni-Cr alloy, precipitation hardenable by additions of Al and Ti. with good corrosion, oxidation resistance and high tensile , creep-rupture properties at temp. 815°C.	Process piping, heat exchangers, carburizing equipment, heating-element sheathing, and nuclear steam-generator tubing.
	Heat resisting steel (SUH660)	An austenitic Ni-Cr-Fe-Mo alloy with high tensile strength at high temperatures widely used expecially targeted for aircraft's high quality parts.	Aircraft engines, industrial turbines, blades shaft, after-burners springs, heat resisting fasteners.
Corrosion Resistant Alloy	Incoloy 825(I-825)	Excellent resistance to both reducing and oxidizing acids,Sulfuric, phosphoric, to stress-corrosion cracking, and to localized attack such as pitting and crevice corrosion.	Downhole tubulars for deep, corrosive wells. Pollution control, scrubber, and rad-waste systems.
	Carpenter 20Cb3 (C-20Cb3)	Good resistance to hot sulfuric acid and many aggressive environments, especially excellent resistance to stress-corrosion cracking. Weldable, machinable, and cold formable.	Chemical processing equipment, oil and gas well piping, heat exchangers, process piping and valves equipment.
	Hastelloy B-2 (HB-2)	With excellent resistance to hydrochloric acid at all concentrations and temperatures, withstanding hydrogen chloride, sulfuric, acetic and phosphoric acids. with excellent resistance to pitting, to stress-corrosion cracking.	Process tubing, piping, tanks, heat exchangers in petro-chemical industries, suitable for most chemical process applications in the as-welded condition.
	Hastelloy C276 (HC-276)	Having excellent corrosion resistance in a wide range of severe environments. Molybdenum content makes it especially resistant to pitting andcrevice corrosion. Low carbon content minimizes carbide precipitation during welding.	Pollution control, chemical processing, pulp and paper production, and waste treatment.
	Hastelloy C-22 (HC-22)	Excellent resistance to both oxidizing and reducing acid environments as well as those containing mixed acids. It is particularly useful for resistance to pitting and crevice corrosion in acid-halide environments.	Chemical processing, pollution control, flue gas desulfurization, waste incineration, and pulp and paper processing industries.
	Inconel 622 (I-622)		
	Inconel 686 (I-686)	Corrosion resistance in a wide range of severe environments. The alloy is used in the most severe environments encountered in chemical processing, pollution-control, pulp and paper production.	Chemical processing, heat exchangers, reaction vessels, evaporators, and transfer piping. Air pollution control, stack liners.

Nickel、Nickel-Copper Alloy、Nickel-Iron Alloy

	Name (Symbol)	General Characteristics of Nickel-Chromium, -Copper, -Iron Alloy	Applications
Nickel	Nickel 200 (Ni-200)	Commercially pure(99.6%) wrought nickel with good mechanical properties and resistance to a range of corrosive media.	Processing equpment, particularly to maintain product purity in handling foods, synthetic fibers, and alkalis.
	Nickel 201 (Ni-201)	Like pure Ni-200, wrouht nickel with low C%, makes it superior in brittleness on/over 300°C when it was cold-rolled.	This alloy, cold-rolled, provides highly ductile mechanical properties across a wide temperature range.
	Nickel 205 (VNi)	Wrought nickel similar to Nickel 200 but with compositional adjustments to enhance performance in electrical and electronic applications.	Anodes and grids of electronic valves, magneto-strictive transducers, lead wires, transistor housings, and battery cases.
Nickel-Copper Alloy (Corrosion Resistant Alloy)	Monel 400 (M-400)	Ni-Cu alloy, high tensile strength with easy machinable , excellent corrosion resistance in a range of media inclusing sea water, hydrofluoric , sulfuric, and alkalis acid.	Marine engineering, chemical and hydrocarbon-processing equipment, and heat exchangers, seawater desalination plant
	Monel K-500 (M-K500)	A precipitation-hardenable Ni-Cu alloy that combines the corrosion resistance of Monel 400 with greater strength and hardness. Low permeability, nonmagnetic to under -100°C.	Marine engineering, chemical and hydrocarbon-processing equipment, and heat exchangers. Non magneic high tensile.
	Carlson Alloy 70 30 Cu Ni Alloy	With excellent resistance to corrosion and erosion. It is strong and ductile, utilized in areas where high temperatures and pressures, high velocities and turbulence are serious problems.	Marine service, tidewater power plants, desalinization plants, oil refineries, and in chemical process industry. Seawater ductile tube.
	Carlson Alloy 90 10 Cu Ni Alloy	With further resistance to corrosion, erosion and impingement corrosion resulting from the turbulent flow of water containing air bubbles and silt flowing at a high velocity. With good weldability.	Marine service, tidewater power plants, desalinization plants, oil refineries, and in chemical process industry. Seawater ductile tube.
	Constantan	Resistance alloy with moderate resistivity of 49μΩ•cm and low temperature coefficient of resistance with a flat resistance/temperature curve over a wider range.	Thermocouples with wires made of iron, copper, or chromel. Strain gage alloy.
Nickel-Iron Alloy (Magnetic Low-expansion Alloy)	45% Permalloy (PB)	With the largest permeability among soft magnetic metals can generate stronger magnetic fields with very weak electric current by using an electronagnetic core made of permalloy	Sensitive relays and AC transformers. Solenoid core, stepping motor core, watch parts
	78% Permalloy (PC)	Permalloy has a high magnetic permeability, low coercivity, near zero magnetostricton, and significant anisotropic magnetoresistance. The low magnetostriction is critical for industrial applications.	Cores for tape recorder, heads, motor cases, and CRT shield covers.
	42% Iron-Nickel (DF-42)	Low and nominally constant coefficient of thermal expansion from room temperature to about 350°C. Used for semiconductor industry parts, core of copper-clad wire for sealing into glass envelopes of electric bulbs, radio.	Bi-metal thermostat strip, thermostat rods, force-ramic-to metal seals with alumina ceramics, and various glass-to-metal seals.
	Kovar (KOV)	vacuum melted, Fe-Ni-Co, low expansion with chemical composition of controlled within narrow limits to assure precise thermal expansion properties. Used for hermetic seals with the harder Pyrex glasses and ceramic materials.	Power tubes, microwave tubes, transistors, and diodes. In integrated circuits for the flat package.
	Invar (FN-36)	A nickel-iron low-expansion alloy containing 36% nickel. It maintains nearly constant dimensions over the range of normal atmospheric temperatures, and has a low coefficient of expansion from cryogenic temperatures to about 260°C.	Measuring devices, laser components, bi-metal thermostat strip, thermostat rods, and tanks and-piping for storing and transporting liqufied gases.
	Super Invar (FN-315)	A nickel-iron low-expansion alloy explacing 4% cobalt among Nickel in Inver alloy. It maintains farther constant dimensions over the range of normal atmospheric temperatures, and has a slightly high strength than Invar.	Used in bimetallic thermostats and in rod-and-tube assemblies for temperature regulators.

Titanium

	Name (Symbol)	Titanium	Applications
Pure Titanium	Category 1, 2, 3	Excellent formability and corrosion resistance even in seawater, light weight with specific gravity and high strenth. Extremely low magnetism, super conductivity in bio-compatibility.	Power and Chemical Plant, Aerospace, Ocean-equipment, camera, watch bodies, medical applications.
Pure Titanium Corrosion resistance	Category 11,12,13	Perfectly excellent in corrosion resistance, used for construction material, semi-conductormanufacturing equipments.	Plate type heat exchanger, Steam turbin Blade, Condensor for Power Plant
Titanium Alloy	Category 60	High tensile and superior corrosion-resistance, used in Chemical industries, Machinery industries, and trams-portation equipment's structual materials.	Titanium can also be cast, which must be done in a vacuum furnace because of titanium's reactive nature
	Category 60E	Titanium features excellent corrosion resistance, which stems from a thin oxide surface film which protects it from atmospheric and ovean conditions in a wide variety of chemicals.	Aircraft, sporting equipment, chemical process ingdesalinaton, power generaton equpment, valve endpump parts.

Rare Metal

Name (Symbol)	Rare Metal	Applications
Zirconium	Zirconium is a grayish-white metal, lustrouos, and quite corrosion-reesistant. Zirconium is lighter than steel and its hardness is similar to copper.	The cladding for nuclear fuel rod in & naval nuclear power reactors. Biocompatible implants
Molybdenum	The ability of molybdenum to withstand extreme temperatures without significantly expanding or softening make it useful in applications aircraft parts, electrical contacts, industrial motors, etc.	Foil, sheet, wire, insulated wire, mesh, rod, powder, nanosized activated powder, and tube.
Tantalum	Tantalum is dark, dense, ductile, very hard, easily fabricated, and highly conductive of heat and electriciy. The metal is renowned for its resistance to corrosion by acids.	Electronic components, mainly capacitors and some high-end audio-grade resistors.
Tungsten	The highest melting point 3422°C, lowest vapor pressure and the highest tensile strength and lowest coefficient of thermal expansion of any pure metal, corrosion resistance is excellent.	Aerospace and high temperature uses which include electrical, heating, and welding applications.