Nickel-Copper Cu70/Ni30 alloy

Heanjia Super Metals Co., Ltd

The **Nickel-Copper Cu70/Ni30 alloy** shows exciting features such as physical properties, mechanical features, under regular loading at the high temperatures along with the excellent resistance to corrosion in the variety of sources particularly in the sea water. The features of Copper Nickel alloys are not sufficient for various operations. The particular features of Cu-Ni alloy can be appreciably increased by adding different elements. The additional elements manganese, ferrous, tin, niobium and silicon are significant from the technical view. Moreover chromium, beryllium and aluminum are also essential.

Physical properties of Nickel-Copper Cu70/Ni30 alloy

Symbol	Melting range oC	Electrical conductivity at 20°C m/(Ω .mm^2)	Thermal conductivity at 20°C W/(m . K)	Coefficient of expansion (25 to 300°C) 10^{-6}/K	Elastic modulus EkN/mm^2
CuNi10	1170-1240	2.5	29	16	145

Creep Rupturing Strength of Nickel-Copper Cu70/Ni30 alloy

The creep rupturing strength at the particular temperature is static load recommending the initial cross section of the specimen at the room temperature that leads to fracture in the material after the particular time. The highest load that a material can adhere without fracture for an extremely large time is termed as permanent strain after the particular time. The creeping strength and 1% creeping limit of **Copper-Nickel alloy** that concludes the limit temperature for using the alloy for the prolonged loading is shown below:

Temp, oC	Creep strength in N/mm^2 for time [h]				1% Creep limit in N/mm^2 for the time [h]			
20	-	-	-	-	-	123	116	-
300	239	212	172	(121)	-	105	(93)	-
350	194	143	91	(55)	-	108	65	-
400	121	73	41	-	-	76	45	-
450	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	-	-
550	-	-	-	-	-	-	-	-
600	-	-	-	-	-	-	-	-

The creeping strength and 1% creeping limit for Cu70/Ni30 sheet are shown in the following table:

Temp°C	Creep strength in N/mm^2 for time [h]				1% Creep limit in N/mm^2 for time [h]			
20	-	-	-	-	-	-	-	-
300	-	-	-	-	-	-	-	-
350	(391)	(363)	(326)	-	361	317	(258)	-
400	351	305	244	-	299	232	(166)	-
450	292	221	153	-	211	145	(97)	-

Fatigue Strength

The following table shows the fatigue strength of Cu70/Ni30 alloy and Cu90/Ni10 alloy and other Cu-Ni alloys for 10(8) load cycles:

Cu-Ni Alloy	Fatigue strength in N/mm^2
CuNi10Fe1Mn[1]	150
CuNi25[2]	275
CuNi30Mn1Fe[3]	245
CuNi44Mn1[4]	290

Applications of Nickel-Copper Cu70/Ni30 alloy

Power Industry

The Copper-Nickel Cu70/Ni30 alloy sheet is utilized on the commercial scale in the power stations and heat exchanging systems. The extruded bar and forged parts combined with the casting are excellent choice for the cryogenic vessels and superheaters using in the low temperature, large pressure and steam boiler fitting for condenser tubes and plates in the power production house, oil purification plant, for nuts, pump components, hot steam valves etc.

Mechanical Engineering

In mechanical engineering, the Cu-Ni-Fe alloys are utilized as the feed water heater, large pressure heater, seawater evaporator and super heater in the power stations. The cast and wrought materials with the large amount of iron and other elements are better for turbine blades, worm and gear wheels, brazing alloy for the large chromium steels that are utilized in making permanent magnets.

In aeronautic engineering, the intercooler and oil cooler and honey comb radiators of Cu-Ni alloys comprising of Iron are utilized. Few automobile manufacturers utilize the Copper-Nickel Cu70/Ni30 tubing as the resistance to corrosion tube in the production of automobile brake lines. Moreover the retro fit sets of Copper-Nickel Cu70/Ni30 tubing are used for the various types of automobiles. The performance period of Copper-Nickel Cu70/Ni30 tubing brake lines normally is more than the expected period of vehicle life.

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