7 Buccleuch Avenue,
Craighall Park,
Johannesburg, 2196,
South Africa

NOCKERS
ENGINEERING PRODUCTS

+ 27 11 447 8562
sales@nockers.co.za
www.nockers.co.za

COPPER NICKEL RESISTANCE ALLOYS

Uses		
CuNi2	Very low electrical resistivity, solderable	Terminals, low-resistance, electrical resistors, heating cables with low heating temperature
CuNi6	Low electrical resistivity, solderable	
CuNi10	Low electrical resistivity, corrosion and scaling resistance, solderable	
CuNi15[1]		
CuNi23Mn	Good corrosion and scaling resistance, solderable	Electrical resistors, heating wires, heating cables
CuNi30Mn	Good corrosion and scaling resistance, solderable	Electrical resistors, starters, indicators
CuNi44	Good cold and hot workability, small temperature coefficient of electrical resistance, good corrosion and scaling resistance	Starting, regulating, control and load resistors to DIN 17471; thermocouples, heating elements, tube mounting material
[1] Non-standard electrical resistance alloy not in DIN 17471:1983 With its resistivity of 0.21Ω.mm^2/m it fits well in the gap between CuNi10 with 0.15Ω.mm^2/m and CuNi23Mn with 0.30Ω.mm^2/m		

Composition

Identification Symbol in Accordance with DIN 17471	Material Number	Mean Composition (Mass %)
CuNi2	2.0802	2 Ni; Rem. Cu
CuNi6	2.0807	6 Ni; Rem; Cu
CuNi10	2.0811	10 Ni; Rem. Cu
CuNi23Mn	2.0881	23 Ni; 1.5 Mn; Rem. Cu
CuNi30Mn	2.0890	30 Ni; 3 Mn; Rem. Cu
CuNi44*	2.0842	44 Ni; 1 Mn; Rem. Cu
* This alloy is also standardized in DIN 17664 as CuNi44Mn1		

Physical Properties (Guide Values)

Identification Symbol DIN 17471	Density at 20°C ρ20 kg/dm³	Solidus Temp °C	Specific Heat at 20°C J/(g . K)	Thermal Conductivity at 20°C W/(m . K)	Mean of Coefficient Expansion		Thermo-electric Voltage Versus Copper µV/K
					(20 to 100°C) 10^{-6}/K	(20 to 400°C) 10^{-6}/K	
CuNi2	8.9	1090	0.38	130	16.5	17.5	-15
CuNi6	8.9	1095	0.38	92	16	17.5	-20
CuNi10	8.9	1100	0.38	59	16	17.5	-25
CuNi23Mn	8.9	1150	0.37	33	16	17.5	-30
CuNi30Mn	8.8	1180	0.40	25	14.5	16	-25
CuNi44	8.9	1230-1290[1]	0.41	23	13.5	15	-40

[1] Melting range

Electrical Resistivity in Annealed Condition and Upper Application Temperatures (Guide Values)

Identification Symbol DIN 17471	Electrical Resistivity in Ω. mm²/m						Temperature Coefficient of Electrical Resistance Between 20 and 105°C 10^{-6}/K	Upper Application Limit in Air °C
	20°C	100°C	200°C	300°C	400°C	500°C		
CuNi2	0.05[1]	0.057	0.064	-	-	-	+1000 to +1600	300
CuNi6	0.10[1]	0.107	0.114	0.123	-	-	+500 to +900	300
CuNi10	0.15[1]	0.156	0.162	0.169	0.175	-	+350 to +450	400
CuNi23Mn	0.30[2]	0.308	0.315	0.323	0.331	0.339	+220 to +280	500
CuNi30Mn	0.40[2]	0.404	0.410	0.417	0.424	0.432	+80 to +130	500
CuNi44	0.49[2]	0.49	0.49	0.49	0.49	0.49	-80 to +40	600

[1] Allowable deviation 10%
[2] Allowable deviation 5%

Mechanical Properties at 20°C in Annealed Condition

Identification Symbol	Tensile Strength[1] Rm N/mm² min.	Elongation (Lo = 100 mm) A % for Nominal Diameter in mm				
		0.02 to 0.063[2]	>0.063 to 0.125[2]	>0.125 to 0.5[2]	>0.5 to 1	>1[3]
CuNi2	220	-	approx. 15	approx. 18	≥18	≥25
CuNi6	250	-	approx. 15	approx. 18	≥18	≥25
CuNi10	290	-	approx. 15	approx. 20	≥20	≥25
CuNi23Mn	350	approx. 12	approx. 18	approx. 20	≥20	≥25
CuNi30Mn	400	approx. 12	approx. 18	approx. 20	≥20	≥25
CuNi44*	420	approx. 12	approx. 18	approx. 20	≥20	≥25

[1] Values are applicable to wire with diameter more than 2 mm; values are substantially higher for smaller diameters. Values also apply to flat wire and strip whose thickness is equal to diameter.
[2] Only guide values.
[3] Measurement length Lo can be agreed for wire diameters more than 3 mm.