CuNi44Mn1

Constantan

		DIN	EN Nr.	UNS (ASTM)	AISI	JGHD
Designation	**CuNi44Mn1**	2.0842	-	C 72150	-	**A102**

Chemical composition

Cu	Ni	Mn	Fe	C	Pb	S	Zn	Others
Balance	43.0 - 45.0	0.50 - 2.00	≤ 0.50	≤ 0.05	≤ 0.01	≤ 0.02	≤ 0.20	≤ 0.10

Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precisely than the composition indicated.

Main technical properties and features

Constantan CuNi44Mn1 is a copper-nickel alloy containing approximately 45 % nickel. This alloy is characterized by a low electrical resistivity variation, i.e., it remains constant over a wide temperature range. This feature makes this alloy a material of choice for use in precision measurement devices.

The alloy CuNi44Mn1 has good corrosion resistance, good malleability, good ductility and it can be easily welded. Thanks to its very high electromotive force (EMF), CuNi44Mn1 can be used in thermocouples fabrication combined with other metals. Moreover, adherent oxide coating with excellent electrical insulation can be applied on the strip surface. The maximum operating temperature is 600 ºC.

Typical uses

Strain gauges, electrical resistors sensitive to temperature variations, electrical resistors for measurement, shunt resistors for ammeters, thermocouples, etc.

Typical manufacturing range

		Thickness (mm)	Width (mm)	Length (mm)
Rolled products	Strip in coils [1]	0.0025 - 0.10	1.5 - 200.0	-
	Strip as sheets [1]	0.010 - 1.500	10.0 - 200.0	100 - 3000

[1] Not all our production possibilities are presented here. Other dimensions or product forms available upon request. Some combinations of thicknesses and widths are not possible.

Mechanical properties of strips

Temper			R_m (N/mm^2)	A_{50mm} (%)	Hardness HV
R360	H90	soft annealed	360 - 460	25 min.	90 - 135
R500	H150	½ hard	500 - 700	4 min.	150 - 220
R740	H230	hard	740 min.	-	-

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Physical properties

Modulus of elasticity	kN/mm^2	165
Density	g/cm^3	8.9
Melting point	°C	1230-1290
Linear dilatation coefficient (20-300 ºC)	10^{-6}·/ ºC	14.5
Thermal conductivity at 20°C	W/m °K	21.2
Thermal capacity (C_p) at 20ºC	kJ/kg K	0.41
Maximum application temperature	°C	600
Temperature coefficient of electrical resistance (20-105 °C)	10^{-6}·/K	-80 à +40
Electrical resistivity (20-500 ºC)	μΩcm	49
Electrical conductivity	MS/m	2
Electrical conductivity	% IACS	3.5
Magnetic properties		Non magnetic

Tolerances (strip and foil)

Thickness

The table shown is an outline of our typical thickness tolerances available. They are tighter than industry standards.

Our "JGHD Precision" and "JGHD Extreme" tolerances are available upon request.

Thickness (mm)		EN Standard		Lamineries MATTHEY		
≥	<	10140 Precision	10258 Precision	LMSA Standard	LMSA Precision	LMSA Extreme
-	0.025	-	-	-	-	± 0.001
0.025	0.050	-	-	± 0.003	± 0.002	± 0.0015
0.050	0.065	-	± 0.003	± 0.003	± 0.0025	± 0.002
0.065	0.100	-	± 0.004	± 0.004	± 0.0035	± 0.003
0.100	0.125	± 0.005	± 0.006	± 0.005	± 0.004	± 0.003
0.125	0.150	± 0.005	± 0.006	± 0.005	± 0.005	± 0.004
0.150	0.250	± 0.010	± 0.008	± 0.008	± 0.006	± 0.004
0.250	0.300	± 0.010	± 0.009	± 0.009	± 0.007	± 0.005
0.300	0.400	± 0.010	± 0.010	± 0.010	± 0.007	± 0.005
0.400	0.500	± 0.015	± 0.012	± 0.012	± 0.008	± 0.006
0.500	0.600	± 0.015	± 0.014	± 0.014	± 0.010	± 0.007
0.600	0.800	± 0.015	± 0.015	± 0.015	± 0.010	± 0.007
0.800	1.000	± 0.015	± 0.018	± 0.018	± 0.012	± 0.009
1.000	1.200	± 0.020	± 0.020	± 0.020	± 0.015	± 0.012
1.200	1.250	± 0.020	± 0.020	± 0.020	± 0.015	± 0.012
1.250	1.500	± 0.020	± 0.020	± 0.020	± 0.015	± 0.014

Width

Our width tolerances "Standard" is +0.2, -0.0 (or ± 0.1 mm upon request). They are available for slit widths < 125 mm and thicknesses < 1.00 mm. Special tolerances upon request.

Camber

Our tolerance "JGHD Standard" respects the EN Standard 1654 (Length of measurement 1000 mm).
Other tolerances upon request.

Width (mm)		Camber max. (mm/m)			
		LMSA Standard		LMSA Extreme	
>	≤	≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 0.5 mm
3	6	12	-	6	-
6	10	8	10	4	5
10	20	4	6	2	3
20	250	2	3	1	1.5

Surface

Special surface qualities upon request

Flatness

Special requirement on the longitudinal or transversal flatness upon request

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