ZERANIN® 30

ISABELLENHÜTTE

Brand Name	ZERANIN® 30 [1]		
Material Code	[2]		
Abbreviation	CuMn7Sn		
Chemical Composition (mass components) in % Average values of alloy components			
Cu Rem.	Mn 7	Sn 2.3	

Form of Delivery

ZERANIN® 30 is supplied in the form of round wires in the range of 8 to 0.02 mm Ø in bare or enamelled condition and/or with silk covering.

Special versions can be supplied as well as flat wires, **stranded wires and tubes.**

Properties and Application Notes

ZERANIN® 30 is well known for its low temperature coefficient between 20 and 60 °C with a very flat parabolic shape of the R(T)-curve, high long-term stability of the electrical resistance, low thermal EMF versus copper and good workability.
In addition, the very low temperature coefficient applies to a relatively wide temperature range.
This alloy is mainly used for precision resistors.
The maximum working temperature in air is 140 °C. However, higher thermal loads in a non-oxidizing atmosphere are possible. Exceeding the maximum working temperature in air may result in a resistance drift generated by oxidizing processes. Thus, the long-term stability could be affected negatively. As a result, the resistivity as well as the temperature coefficient of the electric resistance may change slightly.

Electrical Resistance in Annealed Condition

Temperature coefficient[3] of electrical resistance between	Electrical resistivity in: µΩ x cm (first line) and Ω/CMF (second line) Reference Values					
20 °C and 60 °C	20 °C	100 °C	200 °C	300 °C	400 °C	500 °C
10^{-6}/K	tolerance ±5 %					
Stand.: ±10	29	29	-	-	-	-
Special: ± 3	174	174	-	-	-	-

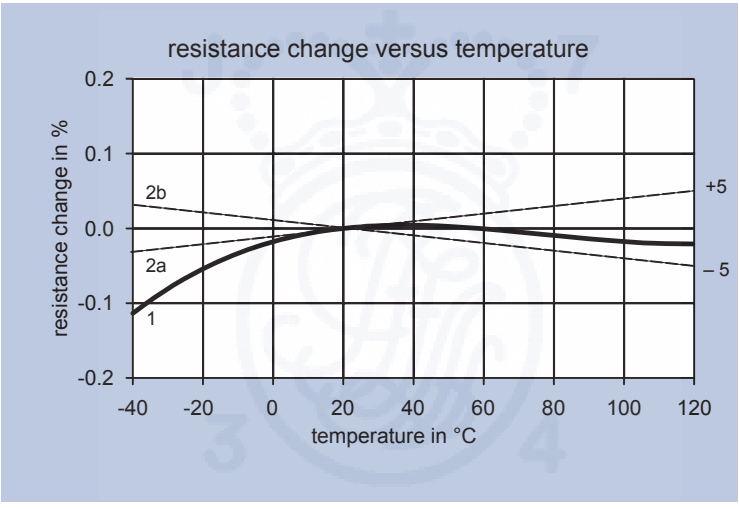
Physical Characteristics (Reference Values)

Density at 20 °C		Melting Point	Specific heat at 20 °C	Thermal conductivity at 20 °C	Average linear thermal expansion coefficient between 20 °C and		Thermal EMF against copper at 20 °C
					100 °C	400 °C	
g/cm³	lb/cub in	°C	J/g K	W/m K	10^{-6}/K	10^{-6}/K	µV/K
8.5	0.31	1000	0.39	34	18	19.5	- 1

Strength Properties at 20° C in Annealed Condition

Tensile Strength[4]		Elongation (L_0 = 100 mm) % at nominal diameter in mm				
MPa	psi	0.02 to 0.063	>0.063to0.125	> 0.125 to 0.5	> 0.5 to 1	> 1
370	53650	≈ 12	≈ 18	≈ 20	≥ 20	≥ 25

1) ZERANIN® 30 is a registered trademark of Isabellenhütte Heusler GmbH & Co. KG.
2) This alloy is not standardized.
3) On request, the temperature coefficient can be lowered still further.
4) This value applies to wires of 2 mm diameter. For thinner wires, the minimum values will substantially increase, depending on the dimensions.



Graph 1:
Electrical resistance depending on the temperature

Special Remarks on the Temperature Coefficient

The variations of the electrical resistance versus temperature in the range between -40 and +120 °C, referred to 20 °C, is shown in graph 1. Curve 1 is the ideal curve which can be approximated. The two straight lines 2a and 2b represent the TC = ± 5 ppm/K.

Notes on Treatment

ZERANIN® 30 can be worked very easily. The alloy can be soft soldered; in air however, it develops a thin oxide film which must be removed before working. With an appropriate flux ZERANIN® 30 is also suitable for dip-tinning. ZERANIN® 30 can also be brazed and welded.

Nominal Diameter d	Cross Section	Weight per 100 m	DC Resistance Referred to Length at 20 °C Ω / m			
mm	mm²	g	Nominal Value	Tolerance	Minimum Value	Maximum Value
0.04	0.001257	1.07	231		212	249
0.045	0.001590	1.35	182		168	197
0.05	0.001963	1.67	148		136	160
0.056	0.002463	2.09	118		108	127
0.06	0.002827	2.40	103		94	111
0.063	0.003117	2.65	93	± 8 %	86	101
0.07	0.003848	3.27	75		69	81
0.071	0.003959	3.37	73		67	79
0.08	0.005027	4.27	57.7		53.1	62.3
0.09	0.006362	5.41	45.6		41.9	49.2
0.10	0.007854	6.68	36.9		34.0	39.9
0.11	0.009503	8.08	30.5		28.4	32.7
0.112	0.009852	8.37	29.4		27.4	31.5
0.12	0.01131	9.61	25.6		23.8	27.4
0.125	0.01227	10.4	23.6		22.0	25.3
0.13	0.01327	11.3	21.8	± 7 %	20.3	23.4
0.14	0.01539	13.1	18.8		17.5	20.2
0.15	0.01767	15.0	16.4		15.3	17.6
0.16	0.02011	17.1	14.4		13.4	15.4
0.18	0.02545	21.6	11.4		10.6	12.2
0.20	0.03142	26.7	9.2		8.70	9.80
0.22	0.03801	32.3	7.6		7.20	8.10
0.224	0.03941	33.5	7.4	± 6 %	6.90	7.80
0.25	0.04909	41.7	5.91		5.55	6.26
0.28	0.06158	52.3	4.71		4.43	4.99
0.30	0.07069	60.1	4.10		3.86	4.35
0.315	0.07793	66.2	3.72		3.54	3.91
0.35	0.09621	81.8	3.01		2.86	3.16
0.355	0.09898	84.1	2.93	± 5 %	2.78	3.08
0.40	0.1257	107	2.31		2.19	2.42
0.45	0.1590	135	1.82		1.73	1.91
0.50	0.1963	167	1.48		1.40	1.55
0.55	0.2376	202	1.22		1.17	1.27
0.56	0.2463	209	1.18		1.13	1.22
0.60	0.2827	240	1.03		0.980	1.07
0.63	0.3117	265	0.93		0.890	0.970
0.65	0.3318	282	0.87		0.840	0.910
0.70	0.3848	327	0.75		0.720	0.780
0.71	0.3959	337	0.73		0.700	0.760
0.80	0.5027	427	0.577		0.554	0.600
0.90	0.6362	541	0.456		0.438	0.474
1.0	0.7854	668	0.369		0.354	0.384
1.12	0.9852	837	0.294		0.283	0.306
1.2	1.131	961	0.256		0.246	0.267
1.25	1.227	1043	0.236		0.227	0.246
1.4	1.539	1309	0.188		0.181	0.196
1.5	1.767	1502	0.164		0.158	0.171
1.6	2.011	1709	0.144		0.138	0.150
1.8	2.545	2163	0.114		0.109	0.119
2.0	3.142	2670	0.092	± 4 %	0.0890	0.0960
2.2	3.801	3231	0.076		0.0730	0.0790
2.24	3.941	3350	0.074		0.0710	0.0770
2.5	4.909	4172	0.0591		0.0567	0.0614
2.8	6.158	5234	0.0471		0.0452	0.0490
3.0	7.069	6008	0.0410		0.0394	0.0427
3.15	7.793	6624	0.0372		0.0357	0.0387
3.2	8.042	6836	0.0361		0.0346	0.0375
3.5	9.621	8178	0.0301		0.0289	0.0313
3.55	9.898	8413	0.0293		0.0281	0.0305
4.0	12.57	10681	0.0231		0.0222	0.0240
4.5	15.90	13519	0.0182		0.0175	0.0190
5.0	19.63	16690	0.0148		0.0142	0.0154
5.5	23.76	20195	0.0122		0.0117	0.0127
5.6	24.63	20936	0.0118		0.0113	0.0122
6.0	28.27	24033	0.0103		0.00980	0.0107
6.3	31.17	26497	0.0093		0.00890	0.00970
8.0	50.27	42726	0.00577		0.00554	0.00600

Isabellenhütte Heusler GmbH & Co. KG
Eibacher Weg 3-5 - D-35683 Dillenburg - Phone +49 (0) 27 71 9 34 - 0 - Fax: +49 (0) 27 71 2 30 30
E-Mail: sales.alloys@isabellenhuette.de • www.isabellenhuette.de