

Brand Name	ISAOHM® 1)				
Material Code	2.4872				
Abbreviation	NiCr20AlSi				
Chemical Composition (mass components) in % Average values of alloy components					
Ni	Cr	Al	Si	Mn	Fe
Rem.	20	3.5	1	0.5	0.5

### Form of Delivery

ISAOHM® is supplied in the form of round wire in the dimension 0.6 to 0.01 mm Ø in bare, oxidized (non-insulating oxide film) or enamelled condition, also with rayon or silk

covering. To a limited extent flat wires and stranded wires are also manufactured.

### Properties and Application Notes

ISAOHM® is especially characterized by its high resistivity, the low temperature coefficient, the low thermal EMF versus Copper, the high tensile strength and the high resistance to oxidation and chemical corrosion. The alloy is non-magnetic. ISAOHM® is suitable for high-value resistors and potentiometers for example for the automotive and consumer electronics industries as well as for testing and automatic control equipment. ISAOHM® is also used for heating cords and cables. When used as material for high precision resistors the maximum working temperature in air is 250 °C. The maximum working temperature in air is 250 °C; at higher temperatures the resistivity and temperature coefficient may be affected irreversibly. For others applications, for heating cords for instance, it can be used at higher temperatures, especially in non-oxidating atmosphere.

### Electrical Resistance in Annealed Condition

Temperature coefficient of electrical resistance between 20 °C and 105 °C 10 <sup>-6</sup> /K	Electrical resistivity <sup>2)</sup> in: μΩ x cm (first line) and Ω/CMF (second line) Reference Values					
	20 °C	100 °C	200 °C	300 °C	400 °C	500 °C
Stand.: -50 to +50	132	132	132	-	-	-
Special: ±3, ±10	794	794	794	-	-	-

### Physical Characteristics (Reference Values)

Density at 20 °C		Melting Point °C	Specific heat at 20 °C J/g K	Thermal conductivity at 20 °C W/m K	Average linear thermal expansion coefficient between 20 °C and		Thermal EMF against copper at 20 °C μV/K
g/cm <sup>3</sup>	lb/cub in				100 °C 10 <sup>-6</sup> /K	400 °C 10 <sup>-6</sup> /K	
8.0	0.29	1400	0.46	14	14	15	+1

### Strength Properties at 20 °C in Annealed Condition

Tensile Strength <sup>3)</sup>		Elongation (L <sub>0</sub> = 100 mm) % at nominal diameter in mm				
MPa	psi	0.02 to 0.063	> 0.063 to 0.125	> 0.125 to 0.5	> 0.5 to 1	> 1
1000	145000	≈ 8	≈ 15	≈ 20	≥ 20	-

1) ISAOHM® is a registered trademark of Isabellenhütte Heusler GmbH & Co. KG.

2) The resistivity of nickel-chromium alloys can be modified by special heat treatment (see Technical Information).

3) This value applies to wires of 0.6 mm Ø. For thinner wires the minimum values will substantially increase, depending on the dimension.

### Notes on Treatment

ISAOHM® can easily be welded and brazed. Under certain conditions soldering is possible (see Technical Information).

### Special Remarks on the Temperature Coefficient (TC)

(for further technical details please see Technical Information)

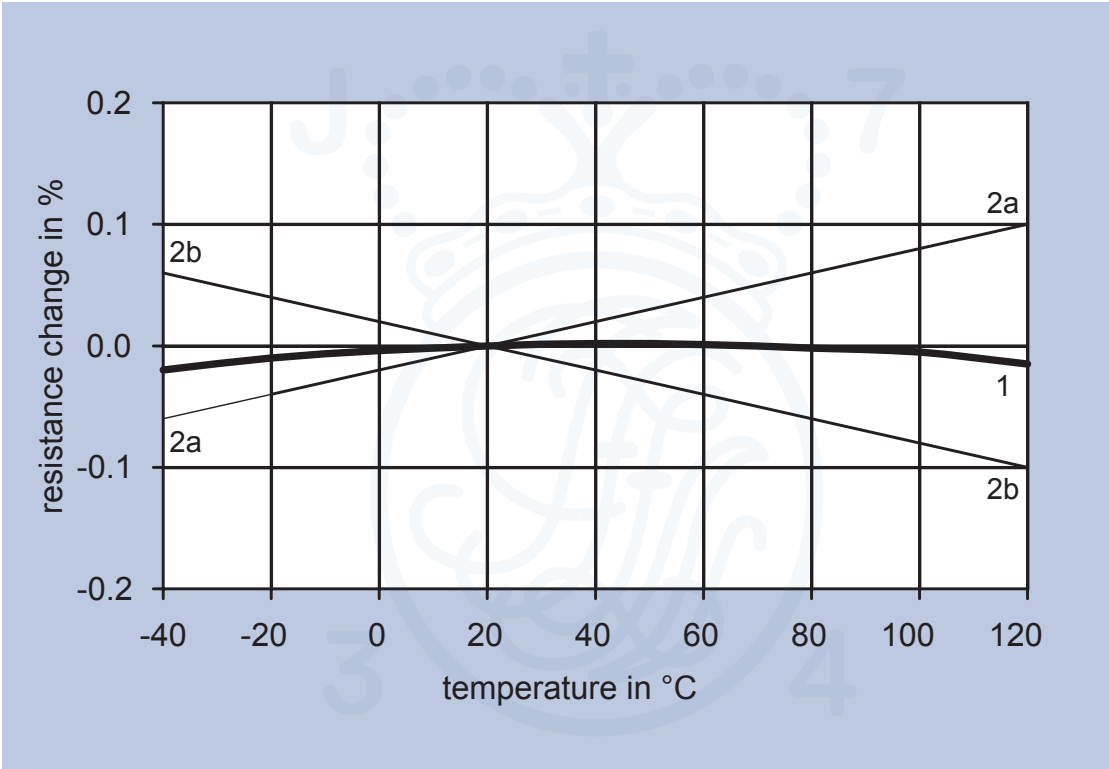
The temperature dependence of ISAOHM® in the range between -40 and 120 °C, referred to 20 °C, is shown in graph 1, page 10.

Curve 1 represents the typical R(T)-curve. Due to the very flat behaviour between 20 and 60 °C TC-values as low as 1 ppm/K can be produced.

The straight lines 2a and 2b apply to a TC = ±10 ppm/K. Wires with a temperature coefficient in this range meet the requirements of DIN 46463 and can be used as precision resistance wires.

Nominal Diameter d mm	Cross Section mm <sup>2</sup>	Weight per 100 m g	DC Resistance Referred to Length at 20 °C Ω / m			
			Nominal Value	Tolerance	Minimum Value	Maximum Value
0.01	0.00007854	0.0628	16807	± 10 %	15126	18487
0.011	0.00009503	0.0760	13890		12501	15279
0.013	0.0001327	0.106	9945		8950	10939
0.014	0.0001539	0.123	8575		7717	9432
0.016	0.0002011	0.161	6565		5909	7222
0.018	0.0002545	0.204	5187		4669	5706
0.02	0.0003142	0.251	4202	± 8 %	3866	4538
0.022	0.0003801	0.304	3473		3195	3750
0.025	0.0004909	0.393	2689		2474	2904
0.028	0.0006158	0.493	2144		1972	2315
0.03	0.0007069	0.565	1867		1718	2017
0.032	0.0008042	0.643	1641		1510	1773
0.036	0.001018	0.814	1297		1193	1401
0.04	0.001257	1.01	1050		966	1135
0.045	0.001590	1.27	830		764	896
0.05	0.001963	1.57	672		619	726
0.056	0.002463	1.97	536		493	579
0.06	0.002827	2.26	467		430	504
0.063	0.003117	2.49	424		390	457
0.07	0.003848	3.08	343		316	370
0.071	0.003959	3.17	333		307	360
0.08	0.005027	4.02	263		242	284
0.09	0.006362	5.09	208		191	224
0.10	0.007854	6.28	168		155	182
0.11	0.009503	7.60	139	± 5 %	132	146
0.112	0.009852	7.88	134		127	141
0.12	0.01131	9.05	117		111	123
0.125	0.01227	9.82	108		102	113
0.13	0.01327	10.6	99.4		94.5	104
0.14	0.01539	12.3	85.7		81.5	90.0
0.15	0.01767	14.1	74.7		71.0	78.4
0.16	0.02011	16.1	65.7		62.4	68.9
0.18	0.02545	20.4	51.9		49.3	54.5
0.20	0.03142	25.1	42.0		39.9	44.1
0.22	0.03801	30.4	34.7		33.0	36.5
0.224	0.03941	31.5	33.5		31.8	35.2
0.25	0.04909	39.3	26.9		25.5	28.2
0.28	0.06158	49.3	21.4		20.4	22.5
0.30	0.07069	56.5	18.7		17.7	19.6
0.315	0.07793	62.3	16.9		16.1	17.8
0.35	0.09621	77.0	13.7		13.0	14.4
0.355	0.09898	79.2	13.3		12.7	14.0
0.40	0.1257	101	10.5		9.98	11.0
0.45	0.1590	127	8.30		7.88	8.71
0.50	0.1963	157	6.72		6.39	7.06
0.55	0.2376	190	5.56	5.28	5.83	
0.56	0.2463	197	5.36	5.09	5.63	
0.60	0.2827	226	4.67	4.44	4.90	
0.63	0.3117	249	4.23	4.02	4.45	
0.65	0.3318	266	3.98	3.78	4.18	
0.70	0.3848	308	3.43	3.26	3.60	
0.71	0.3959	317	3.33	3.17	3.50	

Graph 1  
Electrical Resistance vs.  
Temperature



\* 1 ppm =  $1 \cdot 10^{-6} = 0.0001\%$ , 1000 ppm =  $1 \cdot 10^{-3} = 0.1\%$ .

Graph 2  
Electrical Resistance vs.  
Temperature

