



Brand Name	ISA®-CHROM 60¹⁾				
Material Code	2.4867				
Abbreviation	NiCr6015				
Chemical Composition (mass components) in %. Average values of alloy components					
Ni	Fe	Cr			
Rem.	20	15			

Features and Application Notes

ISA®-CHROM 60 is especially characterized by high resistivity and high resistance to oxidation and chemical corrosion. The alloy is suitable for high-value electrical resistors and for heating wires for any application, also for heating cords and cables. The maximum working temperature in air is +600 °C when used for resistance wires and +1,150 °C when used for heating wires.

Form of Delivery

ISA®-CHROM 60 is supplied in the form of round wires in the range 0.01 to 1.00 mm Ø in bare, oxideinsulated or enamelled condition, flat wires and stranded wires are also manufactured.

Notes on Treatment // ISA®-CHROM 60 can easily be spot-welded. Under certain conditions brazing and soldering is possible (see Technical Information).

Electrical Resistance in Annealed Condition

Temperature coefficient ²⁾ of electrical resistance between		Electrical resistivity ³⁾ in: $\mu\Omega \times \text{cm}$ (first line) and Ω/CMF (second line) Reference Values				
+20 °C and +105 °C $10^{-6}/\text{K}$	+20 °C tolerance $\pm 5\%$	+100 °C	+200 °C	+300 °C	+400 °C	+500 °C
+100 to +200	111	112	114	116	118	122
	668	674	686	698	710	734

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
g/cm^3	$\text{lb}/\text{cub in}$				+100 °C	+400 °C	
		°C	$\text{J}/\text{g K}$	$\text{W}/\text{m K}$	$10^{-6}/\text{K}$	$10^{-6}/\text{K}$	$\mu\text{V}/\text{K}$
8.20	0.30	+1,390	0.46	13.00	13.50	15.00	+1.00

Mechanical Properties at +20 °C in Annealed Condition

Tensile Strength ⁴⁾		Elongation ($L_0 = 100 \text{ mm}$) % at nominal diameter in mm				
MPa	psi	0.020 to 0.063	> 0.063 to 0.125	> 0.125 to 0.50	> 0.50 to 1.00	> 1.00
600	87,000	≈ 8	≈ 14	≈ 18	≥ 18	≥ 25

The specifications of the electrical and physical properties generally reference the following standards:

DIN 17 471	Resistance Alloys – Properties
ASTM B267	Standard specification for wires for the production of wirewound resistors
DIN 17 470	Heating conductor alloys – Technical delivery conditions for round and flat wires
ASTM B344	Standard specification for drawn/rolled nickel-chromium and nickel-chromium-iron wires for electric heating elements

Properties and requirements depend on the material condition (formed, annealed ...) as well as the design (bare, insulated ...) and may deviate from the specified values.

1) ISA®-CHROM 60 is a registered trademark of Isabellenhütte Heusler GmbH & Co. KG.

2) These values apply to the state after rapid cooling.

3) The resistivity of nickel-chromium Alloys can be modified by special heat treatment (see Technical information).

4) This value applies to wires of 2.0 mm Ø. For thinner wires the minimum values will substantially increase, depending on the dimension.

Nominal Diameter mm	Cross Section mm ²	Weight per 1.000 m g	DC Resistance Referred to Length at +20 °C Ω/m			
			Nominal Value	Tolerance	Minimum Value	Maximum Value
0.010	0.00007854	0.644	14,133	±10 %	12,720	15,546
0.011	0.00009503	0.779	11,680		10,512	12,848
0.013	0.0001327	1.09	8,363		7,526	9,199
0.014	0.0001539	1.26	7,211		6,490	7,932
0.016	0.0002011	1.65	5,521		4,969	6,073
0.018	0.0002545	2.09	4,362		3,926	4,798
0.020	0.0003142	2.58	3,533		3,251	3,816
0.022	0.0003801	3.12	2,920		2,686	3,154
0.025	0.0004909	4.03	2,261		2,080	2,442
0.028	0.0006158	5.05	1,803		1,659	1,947
0.030	0.0007069	5.80	1,570	1,445	1,696	
0.032	0.0008042	6.59	1,380	1,270	1,491	
0.036	0.001018	8.35	1,091	1,003	1,178	
0.040	0.001257	10.30	883	813	954	
0.045	0.001590	13.00	698	642	754	
0.050	0.001963	16.10	565	520	611	
0.056	0.002463	20.20	451	415	487	
0.060	0.002827	23.20	393	361	424	
0.063	0.003117	25.60	356	328	385	
0.070	0.003848	31.60	288	265	312	
0.071	0.003959	32.50	280	258	303	
0.080	0.005027	41.20	221	203	239	
0.090	0.006362	52.20	175	161	188	
0.100	0.007854	64.40	141	130	153	
0.110	0.009503	77.90	117	111	123	
0.112	0.009852	80.80	113	107	118	
0.120	0.01131	92.70	98.1	93.2	103	
0.125	0.01227	101.00	90.5	85.9	95.0	
0.130	0.01327	109.00	83.6	79.4	87.8	
0.140	0.01539	126.00	72.1	68.5	75.7	
0.150	0.01767	145.00	62.8	59.7	66.0	
0.160	0.02011	165.00	55.2	52.4	58.0	
0.180	0.02545	209.00	43.6	41.4	45.8	
0.200	0.03142	258.00	35.3	33.6	37.1	
0.220	0.03801	312.00	29.2	27.7	30.7	
0.224	0.03941	323.00	28.2	26.8	29.6	
0.250	0.04909	403.00	22.6	21.5	23.7	
0.280	0.06158	505.00	18.0	17.1	18.9	
0.300	0.07069	580.00	15.7	14.9	16.5	
0.315	0.07793	639.00	14.2	13.5	15.0	
0.350	0.09621	789.00	11.5	11.0	12.1	
0.355	0.09898	812.00	11.2	10.7	11.8	
0.400	0.1257	1,030.00	8.83	8.39	9.27	
0.450	0.1590	1,300.00	6.98	6.63	7.33	
0.500	0.1963	1,610.00	5.65	5.37	5.94	
0.550	0.2376	1,950.00	4.67	4.44	4.91	
0.560	0.2463	2,020.00	4.51	4.28	4.73	
0.600	0.2827	2,320.00	3.93	3.73	4.12	
0.630	0.3117	2,560.00	3.56	3.38	3.74	
0.650	0.3318	2,720.00	3.35	3.18	3.51	
0.700	0.3848	3,160.00	2.88	2.74	3.03	
0.710	0.3959	3,250.00	2.80	2.66	2.94	
0.800	0.5027	4,120.00	2.21	2.01	2.32	
0.900	0.6362	5,220.00	1.74	1.66	1.83	
1.000	0.7854	6,440.00	1.41	1.34	1.48	

