

Nickel-Chromium: Heating Element & Resistance Alloys

Wire • Bar • Strip • Ribbon

These alloys are especially characterized by high resistivity and high resistance to oxidation and chemical corrosion. They are suitable for making high-value electrical resistors, heating wires, heating cords and cables.

NiCr 80:20 is suitable for heating elements used for temperatures up to 1200°C. This is used for electrical cooking equipment, precision resistors. Oxidized wires of these alloys display better insulation properties.

NiCr 70:30 is suitable for heating elements used for temperatures up to 1230°C for industrial furnaces which have alternating oxidizing, or reducing atmosphere. This alloy has excellent corrosion resistance and long life in air and controlled atmospheres.

NiCr 60:15 is suitable for heating elements used for temperatures up to 1150°C. This is used for electrically heated equipment, high resistance and potentiometer resistors.

NiCr 40:20 is suitable for heating elements used for temperatures up to 1050°C. This is used for domestic heating appliances, furnaces in carburizing, or semi-reducing atmospheres.

NiCr 30:20 / NiCr 20:25 are suitable for heating elements used for temperatures up to 1050°C. In spite of relatively high Fe content, these alloys are resistant to oxidation and chemical corrosion. They are used for making heating elements of cooking equipment, heating cords and cables.

Specifications				
Alloy	ASTM	Werkstoff Nr	UNS designation	DIN
NiCr 80:20	B344	2.4869	N06003	17470 / 17471
NiCr 70:30	-	2.4658	N06003	17470
NiCr 60:15	-	2.4867	N06004	17470 / 17471
NiCr 40:20	-	-	-	-
NiCr 30:20	B344	1.4860	-	17470
NiCr 20:25	-	1.4843	-	17470

Nominal Chemical Composition (%)								
Alloy	Ni	Mn	Fe	Si	Cr	C	Al	Cu
NiCr 80:20	Balance	Max 1.0	Max 1.0	1.0-1.5	19-21	Max 0.10	Max 0.30	Max 0.50
NiCr 70:30	Balance	Max 1.0	Max 1.0	1.0-3.0	28-32	Max 0.10	Max 0.20	Max 0.50
NiCr 60:15	Min 57.0	Max 1.0	Max 1.0	1.0-1.5	14-17	Max 0.10	Max 0.30	Max 0.50
NiCr 40:20	Min 37.0	Max 1.0	Balance	1.8-3.0	18-22	Max 0.10	Max 0.30	Max 0.50
NiCr 30:20	Min 28.0	Max 1.0	Balance	1.8-3.0	18-22	Max 0.10	Max 0.30	Max 0.50
NiCr 20:25	Min 18.0	Max 1.0	Balance	1.0-1.5	23-27	Max 0.10	Max 0.30	Max 0.50

Physical & Mechanical Properties (at room temperature)

Alloy	Density g/cm ³	Tensile Strength N/mm ²	Elongation % at L ₀ =100 mm	Specific Heat at 20°C J/kg°C	Coeff of Linear Expansion b/w 20-1000°C 10 ⁻⁶ /K	Maximum Operating Temp of Heating Element °C
NiCr 80:20	8.41	700-900	25-35	435	17	1200
NiCr 70:30	8.16	800-950	25-30	460	17	1250
NiCr 60:15	8.25	700-850	25-35	450	17	1150
NiCr 40:20	7.95	700-850	25-35	460	19	1050
NiCr 30:20	7.90	650-800	25-35	500	19	1050
NiCr 20:25	7.80	600-800	25-35	500	14	1050

Electrical Properties

Alloy	Specific Resistance (Electrical Resistivity) at 20°C	Temp Coeff of Resistance x 10 ⁻⁶ /°C	
	<u>μΩ-cm</u>	<u>Value</u>	<u>Temp Range</u>
NiCr 80:20	108	60	20-1000°C
NiCr 70:30	118	110	20-1000°C
NiCr 60:15	112	170	20-1000°C
NiCr 40:20	105	60	20-1000°C
NiCr 30:20	104	60	20-1000°C
NiCr 20:25	95	60	20-1000°C

For resistance in Ω/m of any size, divide the above resistivity with cross-sectional area in mm² of the size x 100R

$$(\Omega/m) = \frac{\text{Resistivity}(\mu\Omega\text{-cm})}{A(\text{mm}^2) \times 100}$$

Size Range

Form	Dia (mm)	Width (mm)	Thickness (mm)
Wire	0.10-12.0	-	-
Strip	-	10-100	0.2-4.5
Ribbon	-	2.0-4.5	0.2-1.0

Other Grades of Nickel-Chromium resistance alloys are also available. Please contact us for more information.