

FeCrAl Electric Resistance Heating Alloy



Iron-Chromium-Aluminum (FeCrAl) electric resistance heating alloy offers prolonged high temperature service and excellent thermal stability. Outstanding resistance to oxidation and general corrosion. Low temperature coefficient of electric resistivity. High mechanical strength at the elevated temperatures. It is employed in the industrial electric furnaces, quartz tube heaters, heating coils, suspended coils and dryers.

FeCrAl (0Cr25Al5) alloy possesses low temperature coefficient of electric resistivity. It is used to produce high magnitude of heat in the commercial heating operations. It offers excellent resistance to oxidation and corrosion at the high temperatures. It resists scaling and embrittlement of material and provides long term performance in the severe corrosive conditions at the elevated temperatures up to 1250°C.

Chemical Composition

Elements	0Cr25Al5
Chromium	23 to 26
Aluminum	4.5 to 6.5
Rhenium	Suitable
Iron	Rem.

Physical Properties

Properties	0Cr25Al5
Highest application temperature	1250 °C
Resistivity at 20°C (micro ohm-meter)	1.42 micro ohm-meter
Density (gram/cm ³)	7.10 gram/cm ³
Thermal conductivity(KJ/m·h·°C)	46.1
Coefficient of linear expansion(×10 ⁻⁶ per °C)	16.0 ×10 ⁻⁶ per °C
Melting temperature (°C)	1500
Tensile strength (N/mm ²)	630 to 780
Elongation (%) at cracking	Above 12
Reduction of area (%)	60 to 75 %
Bending frequency (F/R)	Above 5
Hardness(H.B.)	200 to 260
Regular application period (Hours/ °C)	Above 80/1300

Corrosion Resistance

FeCrAl (0Cr25Al5) alloy produces a protective alumina layer in the oxidizing conditions. This layer renovates itself as long as it has adequate magnitude of aluminum. Use of aluminum

interrupts while scaling off of oxide when it is placed at thermal gradients. The rare earth metals like Yttrium or silicon enhance the life of oxide layer thus reduce the scaling rate. If concentration of aluminum is not sufficient for renovation of oxide layer, chromium oxide layer is formed. However its falling rate is quicker at high temperature because chromium oxide is volatile above 1100oC.

FeCrAl (0Cr25Al5) alloy offers improved performance and thermal shock resistance as well as produces non-spalling oxide film. It offers high resistance to embrittlement and toughening at temperatures up to 650oF to 1300oF.

FeCrAl (0Cr25Al5) alloy offers outstanding resistance to oxidation and different high temperature corrosive conditions. Resistance to embrittlement is improved by decreasing the content of chromium lower than 15%.

High Temperature Electric Resistivity

Diameter	Cross Sectional area	FeCrAl 0Cr25Al5 Resistivity($\mu\Omega \cdot m$)		
		Resistance at 20oC	Length	Weight
0.10 mm	0.0079 mm ²	181 Ω/m	17936 m/kg	0.0000560 kg/m
0.12 mm	0.0112 mm ²	126 Ω/m	12455 m/kg	0.000081 kg/m
0.15 mm	0.0178 mm ²	80.5 Ω/m	7972 m/kg	0.000130 kg/m
0.17 mm	0.023 mm ²	63 Ω/m	6207 m/kg	0.000162 kg/m
0.19 mm	0.028 mm ²	50.2 Ω/m	4961 m/kg	0.000202 kg/m
0.21 mm	0.035 mm ²	41.1 Ω/m	4067 m/kg	0.0002 kg/m
0.25 mm	0.05 mm ²	29 Ω/m	2872 m/kg	0.000351 kg/m
0.27 mm	0.06 mm ²	25 Ω/m	2462 m/kg	0.000410 kg/m
0.29 mm	0.07 mm ²	26 Ω/m	2132 m/kg	0.000470 kg/m
0.31 mm	0.076 mm ²	19 Ω/m	1868 m/kg	0.000540 kg/m
0.35 mm	0.0963 mm ²	15 Ω/m	1466 m/kg	0.000682 kg/m
0.40 mm	0.126 mm ²	11.4 Ω/m	1123 m/kg	0.000893 kg/m
0.45 mm	0.16 mm ²	8.92 Ω/m	888 m/kg	0.001130 kg/m
0.50 mm	0.1965 mm ²	7.25 Ω/m	719 m/kg	0.001395 kg/m
0.60 mm	0.284 mm ²	5.04 Ω/m	498 m/kg	0.00202 kg/m
0.70 mm	0.383 mm ²	3.7 Ω/m	368 m/kg	0.00278 kg/m
0.80 mm	0.504 mm ²	3 Ω/m	282 m/kg	0.00360 kg/m
0.90 mm	0.64 mm ²	2.24 Ω/m	224 m/kg	0.00453 kg/m
1.00 mm	0.79 mm ²	1.81 Ω/m	179.7 m/kg	0.00560 kg/m
1.20 mm	1.132 mm ²	1.26 Ω/m	124.7 m/kg	0.00804 kg/m
1.40 mm	1.54 mm ²	0.93 Ω/m	91.7 m/kg	0.01095 kg/m
1.60 mm	3.02 mm ²	0.71 Ω/m	70.2 m/kg	0.0143 kg/m
1.80 mm	2.55 mm ²	0.56 Ω/m	55.7 m/kg	0.01804 kg/m
2.00 mm	3.15 mm ²	0.453 Ω/m	44.9 m/kg	0.0224 kg/m
2.20 mm	3.81 mm ²	0.376 Ω/m	37.1 m/kg	0.0271 kg/m
2.50 mm	4.92 mm ²	0.29 Ω/m	28.8 m/kg	0.0352 kg/m
2.80 mm	6.17 mm ²	0.24 Ω/m	22.9 m/kg	0.0445 kg/m
3.00 mm	7.08 mm ²	0.21 Ω/m	19.94 m/kg	0.0504 kg/m
3.50 mm	9.63 mm ²	0.15 Ω/m	14.66 m/kg	0.0685 kg/m

4.00 mm	12.58 mm ²	0.1131 Ω/m	11.23 m/kg	0.0894 kg/m
4.50 mm	15.91 mm ²	0.0894 Ω/m	8.88 m/kg	0.1131 kg/m
5.00 mm	19.64 mm ²	0.0724 Ω/m	7.19 m/kg	0.1396 kg/m
5.50 mm	23.81 mm ²	0.06 Ω/m	5.94 m/kg	0.1692 kg/m
6.00 mm	28.31 mm ²	0.051 Ω/m	4.99 m/kg	0.203 kg/m
6.50 mm	33.21 mm ²	0.043 Ω/m	4.26 m/kg	0.240 kg/m
7.00 mm	38.51 mm ²	0.037 Ω/m	3.68 m/kg	0.276 kg/m

Available Forms

Wire, Mesh, Strip, Foil, Rod, Bar