KANTHAL

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Kanthal AF

(Resistance heating wire and resistance wire)

Kanthal AF is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1300°C (2370°F). The alloy is characterized by excellent oxidation resistance and very good form stability resulting in long element life.

Kanthal AF is typically used in electrical heating elements in industrial furnaces and home appliances.

Example of applications in the appliance industry are in open mica elements for toasters, hair dryers, in meander shaped elements for fan heaters and as open coil elements on fibre insulating material in ceramic glass top heaters in ranges, in ceramic heaters for boiling plates, coils on molded ceramic fibre for cooking plates with ceramic hobs, in suspended coil elements for fan heaters, in suspended straight wire elements for radiators, convection heaters, in porcupine elements for hot air guns, radiators, tumble dryers.

CHEMICAL COMPOSITION

	C %	Si %	Mn %	Cr %	Al %	Fe %
Nominal composition					5.3	Bal.
Min	-	-	-	20.5	-	
Max	0.08	0.7	0.4	23.5	-	

MECHANICAL PROPERTIES

Wire size	Yield strength	Tensile strength	Elongation	Hardness
Ø	$R_{p0.2}$	R_m	A	
mm	MPa	MPa	%	Hv
1.0	500	700	23	230
4.0	475	680	18	230

MECHANICAL PROPERTIES AT ELEVATED TEMPERATURE

Temperature °C	**900**	**1000**	**1100**	**1200**	**1300**
MPa	37	20	12	6	4

Ultimate tensile strength - deformation rate 6.2 x 10^{-2} /min

CREEP STRENGTH - 1% ELONGATION IN 1000 H

Temperature °C	**1100**	**1200**
MPa	1.7	0.3

PHYSICAL PROPERTIES

Density g/cm^3	7.15
Electrical resistivity at 20°C Ω mm^2/m	1.39
Poisson's ratio	0.30

YOUNG'S MODULUS

Temperature °C	**20**	**100**	**200**	**400**	**600**	**800**	**1000**
GPa	220	210	205	190	170	150	130

TEMPERATURE FACTOR OF RESISTIVITY

Temperature°C	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
Ct	1.00	1.01	1.01	1.02	1.03	1.04	1.04	1.05	1.05	1.06	1.06	1.06	1.06

COEFFICIENT OF THERMAL EXPANSION

Temperature °C	Thermal Expansion x 10^{-6}/K
20 - 250	11
20 - 500	12
20 - 750	14
20 - 1000	15

THERMAL CONDUCTIVITY

Temperature °C	50	600	800	1000	1200
W m^{-1} K^{-1}	11	20	22	26	27

SPECIFIC HEAT CAPACITY

Temperature °C	20	200	400	600	800	1000	1200
kJ kg^{-1} K^{-1}	0.46	0.56	0.63	0.75	0.71	0.72	0.74

Melting point °C	1500
Max continuous operating temperature in air °C	1300
Magnetic properties	The material is magnetic up to approximately 600°C (Curie point).
Emissivity - fully oxidized material	0.70