KANTHAL®

Part of Sandvik Group

KANTHAL APM

RESISTANCE HEATING WIRE AND RESISTANCE WIRE

DATASHEET

Kanthal APM is an advanced powder-metallurgical, dispersion-strengthened, ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1425°C (2600°F). The alloy is characterized by exceptionally good form stability and oxidation resistance.

Kanthal APM has low tendency to ageing and low resistance change. It has excellent surface oxide properties, which gives good protection in corrosive atmospheres as well as in atmospheres with high carbon potential, and no scaling.

The unique combination of excellent oxidation properties and form stability contributes to long element service life. The alloy's superior form stability reduces the amount of element support.

Typical applications for Kanthal APM are in high-temperature furnaces for firing of ceramics, heat treatment, in laboratory furnaces, in furnaces for electronic industries and in diffusion furnaces.

CHEMICAL COMPOSITION

	C %	Si %	Mn %	Cr %	Al %	Fe %
†Nominal composition					5.8	Bal.
Min	-	-	-	20.5	-	
Max	0.08	0.7	0.4	23.5	-	

† Note: Composition listed is nominal. Actual composition may vary to meet standard electrical resistance and dimensional tolerances.

MECHANICAL PROPERTIES

Wire size	Yield strength	Tensile strength	Elongation	Hardness
Ø	$R_{p0.2}$	R_m	A	
mm	MPa	MPa	%	Hv
4.0	470	680	20	230

MECHANICAL PROPERTIES AT ELEVATED TEMPERATURE

Temperature °C	900	1000	1100	1200	1300
MPa	40	23	16	12	9

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

Datasheet updated 11/23/2017 3:23:35 PM (supersedes all previous editions)

CREEP STRENGTH - 1% ELONGATION IN 1000 H

Temperature °C	800	900
MPa	8.2	3.5

CREEP STRENGTH - 0.1% ELONGATION IN 1000 H

Temperature °C	1100	1200	1300	1400
MPa	2.3	1.2	0.7	0.4

CREEP RUPTURE STRENGTH

Time	800°C	1472°F	1000°C	1832°F	1200°C	2192°F	1400°C	2552°F
h	MPa	psi	MPa	psi	MPa	psi	MPa	psi
100	15.0	2176	5.6	812	3.3	478	1.3	189
1000	11.3	1640	3.4	478	1.6	232	0.5	72
10000	8.2	1190	2.2	320	0.7	100	0.2	30

The data in the tables apply to material with fine grain structure in the temperature range from 800°C to 900°C, and to material with coarse grain structure in the temperature range from 1100°C to 1400°C.
In the delivery state KANTHAL APM always has a fine grain structure. After use for a certain period of time , the grain size becomes coarse.

PHYSICAL PROPERTIES

Density g/cm^3	7.10
Electrical resistivity at 20°C Ω mm^2/m	1.45
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	1400
Ct	1.00	1.00	1.00	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.04	1.04	1.04	1.05

COEFFICIENT OF THERMAL EXPANSION

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

COEFFICIENT OF THERMAL EXPANSION

Temperature °C	Thermal Expansion x 10^{-6}/K
20 - 750	14
20 - 1000	15
20-1200	16
20-1400	16

THERMAL CONDUCTIVITY

Temperature °C	50	600	800	1000	1200	1400
W m^{-1} K^{-1}	11	20	22	26	27	35

SPECIFIC HEAT CAPACITY

Temperature °C	20	200	400	600	800	1000	1200	1400
kJ kg^{-1} K^{-1}	0.46	0.56	0.63	0.75	0.71	0.72	0.74	0.80

Melting point °C	1500
Max continuous operating temperature in air °C	1425
Magnetic properties	The material is magnetic up to approximately 600°C (Curie point).
Emissivity - fully oxidized material	0.70

Datasheet updated 11/23/2017 3:23:35 PM (supersedes all previous editions)