Kanthal APMT (Tube)

KANTHAL

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Kanthal APMT is an advanced powder metallurgical, dispersion strengthened, ferritic iron-chromium-aluminium alloy (FeCrAlMo alloy) which is used at tube temperatures up to 1250°C (2280°F).

Kanthal APMT tubes have good form stability at high temperature. Kanthal APMT forms an excellent, non-scaling surface oxide, which gives good protection in most furnace environments, i.e. oxidizing, sulphurous and carburizing, as well as against deposits of carbon, ash, etc. The combination of excellent oxidation properties and form stability makes the alloy unique.

Typical applications for Kanthal APMT are as radiant tubes in electrically or gas fired furnaces such as continuous annealing and galvanizing furnaces, seal quench furnaces, holding furnaces and dosing furnaces in the aluminium, zinc, lead industries, thermocouple protection tubes, furnace muffles for sintering applications.

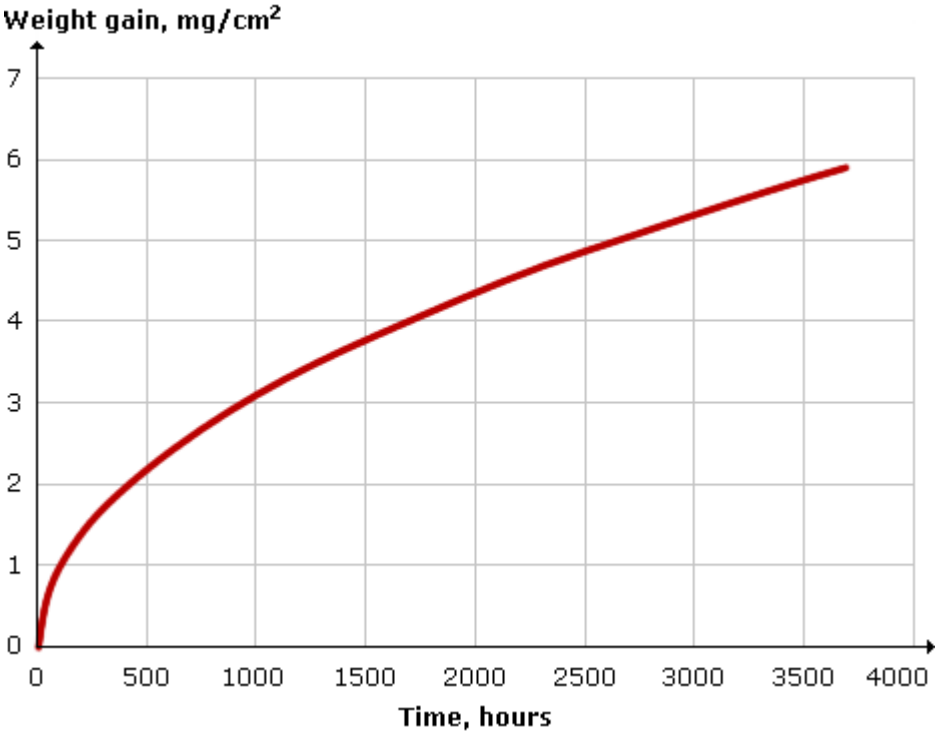
Chemical composition

	C %	Si %	Mn %	Mo %	Cr %	Al %	Fe %
Nominal composition				3.0	21.0	5.0	Balance
Min	-	-	-		20.5	-	
Max	0.08	0.7	0.4		23.5	-	

Corrosion resistance

Maximum recommended operating temperature in air °C	1250
Protective surface oxide	Al_2O_3

Oxidation rate



Weight gain of Kanthal APMT, due to oxide formation, when oxidized in air at 1200°C for 100h cycles with cooling to ambient temperature between each cycle.

Mechanical properties

Yield strength	Tensile strength	Elongation	Hardness
$R_{p0.2}$	R_m	A	
MPa	MPa	%	Hv
540	740	26	250

Remark: The samples are taken in the longitudinal direction from tube in delivery condition.

Mechanical properties at elevated temperature

Creep strength - 1% elongation in 1000 h

Temperature °C	800	900	1000	1100	1200
MPa	21.9	15.6	10.9	5.0	2.1

Remark: The samples are taken in the longitudinal direction from tube in delivery condition. Typical typical initial average grain size is 30-50µm.

Secondary creep rate at various stress levels

Creep rate	Temperature / Stress				
s-1	800 °C MPa	900 °C MPa	1000 °C MPa	1100 °C MPa	1200 °C MPa
1.0 e^{-10}	20.7	12.7	7.7	3.0	1.2
1.0 e^{-8}	25.5	18.0	13.0	6.9	3.0
1.0 e^{-6}	30.8	25.5	22.2	16.2	7.3

Creep rupture strength

Time	Temperature / Stress				
h	800 °C MPa	900 °C MPa	1000 °C MPa	1100 °C MPa	1200 °C MPa
100	28.8	22.0	17.9	10.1	5.0
1000	25.3	17.3	12.3	6.0	2.5
10000	22.0	13.8	8.1	3.5	1.3

Physical properties

Density g/cm^3	7.25
Electrical resistivity at 20 °C Ω mm^2/m	1.40
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	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.03	1.03	1.03	1.03	1.04

Coefficient of thermal expansion

Temperature °C	Thermal Expansion x 10^{-6}/K
20 - 250	12.4
20 - 500	13.1
20 - 750	13.6
20 - 1000	14.7
20 - 1200	15.4

Thermal conductivity

Temperature °C	50	600	800	1000	1200
W m^{-1} K^{-1}	11	21	23	27	29

Specific heat capacity

Temperature °C	20	200	400	600	800	1000	1200
kJ kg^{-1} K^{-1}	0.48	0.56	0.64	0.71	0.67	0.69	0.70

Melting point °C	1500
Magnetic properties	The material is magnetic up to approximately 600°C (Curie point).
Emissivity - fully oxidized material	0.70

Disclaimer: Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Kanthal materials.