

# Kanthal D

## (Resistance heating wire and resistance wire)

Kanthal D is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1300°C (2370°F). The alloy is characterized by high resistivity and good oxidation resistance.

Kanthal D is used in home appliances and industrial furnaces. Typical applications in home appliances include metal sheathed tubular elements for dishwashers, elements embedded in ceramics for panel heaters, cartridge elements in metal dies, heating cables and rope heaters in defrosting and deicing elements, mica elements used in irons, quartz tube heaters for space heating, industrial infrared dryers, in coils on molded ceramic fibre for boiling plates with ceramic hobs, in bead insulated coils for panel heaters, in suspended coil elements for air heaters in laundry dryers.

In industrial applications Kanthal D is used in, for example, terminals to furnace elements, porcupine elements for air heating, and in furnace heating elements.

### CHEMICAL COMPOSITION

|                            | C %  | Si % | Mn % | Cr % | Al % | Fe % |
|----------------------------|------|------|------|------|------|------|
| <b>Nominal composition</b> |      |      |      |      | 4.8  | Bal. |
| <b>Min</b>                 | -    | -    | -    | 20.5 | -    |      |
| <b>Max</b>                 | 0.08 | 0.7  | 0.5  | 23.5 | -    |      |

### MECHANICAL PROPERTIES

| Wire size | Yield strength    | Tensile strength | Elongation | Hardness |
|-----------|-------------------|------------------|------------|----------|
| Ø         | R <sub>p0.2</sub> | R <sub>m</sub>   | A          |          |
| mm        | MPa               | MPa              | %          | Hv       |
| 1.0       | 485               | 670              | 23         | 230      |
| 4.0       | 450               | 650              | 18         | 230      |

### MECHANICAL PROPERTIES AT ELEVATED TEMPERATURE

|                |            |
|----------------|------------|
| Temperature °C | <b>900</b> |
| MPa            | 34         |

Ultimate tensile strength - deformation rate  $6.2 \times 10^{-2}$ /min

### CREEP STRENGTH - 1% ELONGATION IN 1000 H

| Temperature °C | <b>800</b> | <b>900</b> |
|----------------|------------|------------|
| MPa            | 1.2        | 0.5        |

### PHYSICAL PROPERTIES

|                                                            |      |
|------------------------------------------------------------|------|
| <b>Density g/cm<sup>3</sup></b>                            | 7.25 |
| <b>Electrical resistivity at 20°C Ω m mm<sup>2</sup>/m</b> | 1.35 |
| 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 | 1.05 | 1.06 | 1.07 | 1.07 | 1.07 | 1.08 | 1.08 |

## COEFFICIENT OF THERMAL EXPANSION

| Temperature °C | Thermal Expansion x 10 <sup>6</sup> /K |
|----------------|----------------------------------------|
| 20 - 250       | 11                                     |
| 20 - 500       | 12                                     |
| 20 - 750       | 14                                     |
| 20 - 1000      | 15                                     |

## THERMAL CONDUCTIVITY

| Temperature °C                    | 50 | 600 | 800 | 1000 | 1200 |
|-----------------------------------|----|-----|-----|------|------|
| W m <sup>-1</sup> K <sup>-1</sup> | 11 | 20  | 22  | 26   | 27   |

## SPECIFIC HEAT CAPACITY

| Temperature °C                      | 20   | 200  | 400  | 600  | 800  | 1000 | 1200 |
|-------------------------------------|------|------|------|------|------|------|------|
| kJ kg <sup>-1</sup> K <sup>-1</sup> | 0.46 | 0.56 | 0.63 | 0.75 | 0.71 | 0.72 | 0.74 |

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