

THERMOCOUPLE IRON THERMOCOUPLE WIRE

DATASHEET

Thermocouple iron is used for the positive leg of thermocouples type J and L. The alloy is also used as the positive leg of compensating cables type KCA (WX).

The alloy is transformed magnetically at 770°C (1420°F) and a crystallographic transformation occurs at 900°C (1650°F). Both transformations affect the thermoelectric properties of the alloy.

Iron can not be exposed to sulphur-containing atmospheres and to temperatures below zero. Thermocouple iron wire is supplied copper-coated to prevent oxidation.

Thermocouple type J and L are frequently used because of their high emf output and their low cost. Compensating cables of type KCA are used together with thermocouples of type K.

CHEMICAL COMPOSITION

| | C % | Si % | Mn % | Fe % |
|---------------------|------|------|------|------|
| Nominal composition | 0.03 | 0.05 | 0.30 | Bal. |

MECHANICAL PROPERTIES

| Wire size | Yield strength | Tensile strength | Elongation | Hardness |
|-----------|-------------------|------------------|------------|----------|
| ∅ | R _{p0.2} | R _m | A | |
| mm | MPa | MPa | % | Hv |
| 2.0 | - | 450 | 15 | 100 |

PHYSICAL PROPERTIES

| | |
|--|------|
| Density g/cm ³ | 7.86 |
| Electrical resistivity at 20°C Ω mm ² /m | 0.13 |
| Temperature coefficient of resistance between 20°C and 100°C x 10 ⁻⁶ /K | 5000 |

COEFFICIENT OF THERMAL EXPANSION

| Temperature °C | Thermal Expansion x 10 ⁻⁶ /K |
|----------------|---|
| 20 - 100 | 11.7 |

THERMAL CONDUCTIVITY

| | |
|-----------------------------------|------|
| Temperature °C | 100 |
| W m ⁻¹ K ⁻¹ | 66.2 |

SPECIFIC HEAT CAPACITY

| | |
|-------------------------------------|-------|
| Temperature °C | 20 |
| kJ kg ⁻¹ K ⁻¹ | 0.445 |

| | |
|---------------------|--------------------------|
| Melting point °C | 1535 |
| Magnetic properties | The material is magnetic |

RECOMMENDED MAXIMUM CONTINUOUS OPERATING TEMPERATURE

| | | | | | |
|-------------------|------|------|------|------|------|
| Wire size Ø | 3.26 | 1.63 | 1.00 | 0.50 | 0.25 |
| Bare wire °C | 760 | 760 | 720 | 650 | 560 |
| Protected wire °C | 760 | 760 | 760 | 760 | 670 |

Note that the indicated temperatures should be considered as guide values

THERMOELECTRIC PROPERTIES

Iron is used as positive leg in thermocouples of type J, L and in compensating type KCA. The emf values vs the negative thermocouple leg are listed in the data sheets for the respective thermocouples.

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 materials under the trademark Kanthal®.