ISOTAN® is notable for its low temperature coefficient and high resistance to oxidation and chemical corrosion. The alloy is non-magnetic. It is suitable for electrical resistors, potentiometers, heating wires, heating cables and mats. Ribbons are used for heating of bimetals. Because of its high EMF against copper it is not suitable for electrical precision resistors, therefore we recommend MANGANIN®, NOVENTIN® or ZERANIN®. Due to its high thermal EMF against copper, ISOTAN® is also used for thermocouples and compensation cables (see separate brochure or www.thermo-alloys.com). For resistance and heating applications, the maximum working temperature in air is +600 °C.

Form of Delivery

ISOTAN® is supplied in the form of round wire in the dimension 0.02 to 8.00 mm Ø in bare, oxide-insulated or enamelled condition. The range also includes flat wires (see Technical Information), stranded wires, ribbon sheets and foils.

Features and Application Notes

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Physical Characteristics (Reference Values)

Density at +20 °C Melting point Specific heat at +20 °C Thermal conductivity at +20 °C Average linear thermal expansion coefficient between +20 °C and +100 °C and +200 °C +400 °C +500 °C Thermal EMF against copper at +20 °C

g/cm³ lb/cub in °C J/g K W/m K 10^-6 /K 10^-6 /K µV/K
8.90 0.32 +1,280 0.41 23.00 13.50 15.00 -40.00

Mechanical Properties at +20 °C in Annealed Condition

Tensile Strength Elongation (L0 = 100 mm) % at nominal diameter in mm

MPa psi 0.020 to 0.083 > 0.083 to 0.125 > 0.125 to 0.50 > 0.50 to 1.00 > 1.00
420 60,900 = 12 = 18 = 20 ≥ 20 ≥ 25

Notes on Treatment // ISOTAN® can be worked easily. It can be soldered and brazed without difficulty. All known welding methods are applicable.

Special remarks on the temperature coefficient (TC) (see Technical Information) // The variation of electrical resistance vs. temperature in the range between -40 and +120 °C, referred to +20 °C, is shown in graph 1, page 4. Curve 1 represents the ideal curve which can be approximated. Due to the even linear behaviour the TC between +20 and +60 °C is close to 2 ppm/K. The straight lines 2a and 2b apply to a TC = ±40 ppm/K. If not otherwise agreed, normally wires with a temperature coefficient within this range are supplied. It should be noted here that DIN 17471 permits a TC = -80 to +40 ppm/K in the temperature range from +20 to +105 °C. The possible resistance variations in the range from -100 to +300 °C are shown in graph 2. Graph 1 is an enlarged view of the cut-out.

1) ISOTAN® is a registered trademark of Isabellenhütte Heusler GmbH & Co KG, also known as Konstantan®.
2) This value applies to wires of 0.6 mm diam. For thinner wires the minimum values will substantially increase, depending on the dimension.
3) Konstantan® is a registered trademark of KRUPP VDM GmbH.
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<th>Nominal Diameter (mm)</th>
<th>Cross Section (mm²)</th>
<th>Weight per 1,000 m (g)</th>
<th>DC Resistance Referred to Length at +20 °C (Ω/m)</th>
<th>Nominal Value</th>
<th>Tolerance</th>
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</tr>
<tr>
<td>6.300</td>
<td>31.17</td>
<td>277,440.00</td>
<td></td>
<td>0.0157</td>
<td>±4%</td>
<td>0.0151</td>
<td>0.0163</td>
</tr>
<tr>
<td>8.000</td>
<td>50.27</td>
<td>447,360.00</td>
<td></td>
<td>0.00975</td>
<td>±4%</td>
<td>0.00936</td>
<td>0.0101</td>
</tr>
</tbody>
</table>
Graph 1: Electrical resistance vs. temperature (range -40 °C to +120 °C)

Graph 2: Electrical resistance vs. temperature (range -100 °C to +300 °C)