



### Form of Delivery

ISATHERM MINUS® (KN and KNX) is supplied in the form of bare wire with dimensions from 0.03 to 10 mm Ø. We supply coated wires from 0.03 to 1.5 mm Ø. For oxidized wires the available dimensions are 1 to 4 mm Ø.

ISATHERM MINUS® can also be supplied in the form of stranded wire, ribbon, flat wire and rods. Please contact us for the range of dimensions. The dimensions 0.81 (AWG 20) and 1.29 mm Ø (AWG 16) in the KPX/EPX version are usually available ex stock.

Brand Name	ISATHERM MINUS® 1)		
Material Code	2.4122		
Abbreviation	KN / KNX		
Chemical Composition (mass components) in %.			
Average values of alloy components			
Ni	MnAlSi		
Balance	5		

### Thermoelectrical and Electrical Values in Soft-Annealed Condition 3)

EMF versus Cu/NIST 175 0 – 100 °C / mV	EMF versus Pt67/NIST 175 0 – 100 °C / mV	EMF versus Pt67/NIST 175 0 – 1000 °C / mV	Electrical resistivity in μΩ x cm at 20 °C
- 2.056	- 1.283	- 8.777	27

### 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	Magnetic at room temperature
g/cm <sup>3</sup>	°C	J/g K	W/m K	10 <sup>-6</sup> /K	
8.6	1400	0.52	30	16	yes

### Mechanical Properties at 20 °C in Annealed Condition 4)

	Tensile strength MPa	Elongation %	Hardness HV10
hard	> 1050	< 2	> 300
soft	630	35	100

1) ISATHERM MINUS® is a registered trademark of Isabellenhütte Heusler GmbH & Co. KG.

2) ALUMEL® is a registered trademark of Hoskins Manufacturing Company.

3) The exact EMF values according to NIST 175 can be calculated with the "EMF-Software", which can be downloaded from our homepage.

4) The mechanical values considerably depend on dimension. The indicated values refer to a dimension of 1 mm diameter.

### Notes on Treatment

ISATHERM MINUS® can be brazed without difficulty. All known welding methods are applicable.

However, the alloy is difficult to soft-solder.

### Special Remarks on the Alloy

ISATHERM MINUS® reacts corrosively at higher temperatures in the presence of sulphur. Thus the thermoelectric voltage may change dramatically as a result. This oxidation also leads to brittleness of the material.

### Features and Application Notes

ISATHERM MINUS®, also known as ALUMEL®<sup>2)</sup> or NiAlCo, is used as negative leg of the thermocouple type K. For extension leads, ISATHERM MINUS® is used for KNX. The standardized temperature range of the different application possibilities of ISATHERM MINUS®, is available in the tables on pages 10 and 11 as well as 14 and 15. See also "Special Remarks on the Alloy".