



Brand Name	<b>ISA® MINUS<sup>1)</sup></b>				
Material Code					
Abbreviation	<b>KNCA</b>				
Chemical Composition (mass components) in %. Average values of alloy components					
<b>Cu</b>	<b>Ni</b>	<b>Mn</b>	<b>Fe</b>		
Balance	45	2	2		

### Features and Application Notes

ISA® MINUS is used as negative leg for compensating lead KCA as well as positive leg for compensating lead type W5Re/W26Re. ISA® MINUS is standardized in the temperature range between 0 and +150 °C. Isabellenhütte supplies ISA® MINUS in standardized tolerances up to +200 °C.

### Form of Delivery

ISA® MINUS is supplied in the form of wires with dimensions from 0.05 to 8.00 mm Ø in bare condition. Enamelled wires are available in dimensions between 0.05 and 1.50 mm Ø. ISA® MINUS can also be supplied in form of stranded wire, ribbon, flat wire and rods. Please contact us for the range of dimensions.

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

EMF versus Cu/NIST 175 at +100 °C / mV <sup>2)</sup>	EMF versus Pt67/NIST 175 at +100 °C / mV <sup>2)</sup>	EMF versus Cu at +200 °C / mV <sup>2)</sup>	EMF versus Pt67/NIST 175 at +200 °C / mV <sup>2)</sup>	Electrical resistivity in μΩ x cm at +20 °C
<b>-3.000</b>	<b>-2.230</b>	<b>-6.495</b>	<b>-4.659</b>	<b>51</b>

### 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	
<b>8.90</b>	<b>approx. +1,280</b>	<b>0.410</b>	<b>23.00</b>	<b>13.50</b>	<b>no</b>

### Mechanical Properties at +20 °C in Annealed Condition<sup>3)</sup>

	Tensile strength MPa	Elongation %	Hardness HV10
<b>hard</b>	<b>&gt; 840</b>	<b>&lt; 2</b>	<b>&gt; 240</b>
<b>soft</b>	<b>500</b>	<b>30</b>	<b>120</b>

**Notes on Treatment** // ISA® MINUS is easy to process. The alloy can be soldered and brazed without difficulty. All known welding methods are applicable.

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

2) Reference at 0 °C.

3) The mechanical values considerably depend on dimension. The indicated values refer to a dimension of 1.0 mm diameter.