

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-18093-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 25.03.2024

Date of issue: 25.03.2024

Holder of accreditation certificate:

Thermo Sensor GmbH
Carl-Zeiss-Straße 1, 59368 Werne

with the location

Thermo Sensor GmbH
Carl-Zeiss-Straße 1, 59368 Werne

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and they conform to the principles of DIN EN ISO 9001.

Calibration in the fields:

Thermodynamic quantities

Temperature quantities

- **Direct reading thermometers**
- **Thermocouples**
- **Resistance thermometers**

This certificate annex is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de>.

Abbreviations used: see last page

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The calibration laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use calibration standards or equivalent calibration procedures listed here with different issue dates.

The calibration laboratory maintains a current list of all calibration standards / equivalent calibration procedures within the flexible scope of accreditation.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature Resistance thermometers, direct reading thermometers with resistance sensor	-196 °C	DKD-R 5-1:2018 Liquid nitrogen	0.15 K	Comparison with standard resistance thermometers
	-38.8344 °C	DKD-R 5-1:2018 triple point of Mercury	15 mK	Calibration at fixed point temperatures
	0.01 °C	DKD-R 5-1:2018 triple point of Water	5 mK	
	29.7646 °C	DKD-R 5-1:2018 melting point of Gallium	15 mK	
	156.5985 °C	DKD-R 5-1:2018 freezing point of Indium	15 mK	
	231.928 °C	DKD-R 5-1:2018 freezing point of Tin	15 mK	
	419.527 °C	DKD-R 5-1:2018 freezing point of Zinc	20 mK	
	660.323 °C	DKD-R 5-1:2018 freezing point of Aluminium	25 mK	
	-80 °C to < 50 °C	DKD-R 5-1:2018 in liquid bath	60 mK	
	50 °C to < 500 °C	DKD-R 5-1:2018 in vertical 3 zone furnace	0.15 K	
	500 °C to 660 °C		0.2 K	
	Noble metal thermocouples, direct reading thermometers with noble metal thermocouple sensor	156.5985 °C	DKD-R 5-3:2018 freezing point of Indium	0.15 K
231.928 °C		DKD-R 5-3:2018 freezing point of Tin	0.15 K	
419.527 °C		DKD-R 5-3:2018 freezing point of Zinc	0.2 K	
660.323 °C		DKD-R 5-3:2018 freezing point of Aluminium	0.2 K	
-40 °C to < 50 °C		DKD-R 5-3:2018 in liquid bath	0.35 K	Comparison with standard resistance thermometers
50 °C to 660 °C		DKD-R 5-3:2018 in vertical 3 zone furnace	0.4 K	
600 °C to < 1100 °C		DKD-R 5-3:2018 in vertical 3 zone furnace	1.9 K	Comparison with standard thermocouples
1100 °C to < 1350 °C		DKD-R 5-3:2018 in horizontal tube furnace	3.0 K	
1350 °C to 1600 °C			4.0 K	

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Base metal thermocouples; Direct reading with base metal thermocouple sensor	156.5985 °C	DKD-R 5-3:2018 freezing point of Indium	0.4 K	Calibration at fixed point temperatures
	231.928 °C	DKD-R 5-3:2018 freezing point of Tin	0.5 K	
	419.527 °C	DKD-R 5-3:2018 freezing point of Zinc	0.9 K	
	660.323 °C	DKD-R 5-3:2018 freezing point of Aluminium	1.4 K	
	-40 °C to < 50 °C	DKD-R 5-3:2018 in liquid bath	0.4 K	Comparison with standard resistance thermometers
	50 °C to < 100 °C		0.4 K	
	100 °C to 660 °C		1.0 K	
	600 °C to < 1100 °C	DKD-R 5-3:2018 in vertical 3 zone furnace	3.0 K	Comparison with standard thermocouples
1100 °C to 1350 °C	DKD-R 5-3:2018 in horizontal tube furnace	4.0 K		

Abbreviations used:

- CMC Calibration and measurement capabilities
DIN Deutsches Institut für Normung e.V. – German institute for standardization
DKD-R Calibration Guide of Deutscher Kalibrierdienst (DKD) – published by the Physikalisch-Technischen Bundesanstalt
EN Europäische Norm – European Standard
IEC International Electrotechnical Commission
ISO International Organization for Standardisation

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