

# Deutsche Akkreditierungsstelle

## Annex to the Partial Accreditation Certificate D-K-17616-01-01 according to DIN EN ISO/IEC 17025:2018

**Valid from:** 16.01.2023

**Date of issue:** 16.01.2023

This annex is a part of the accreditation certificate D-K-17616-01-00.

Holder of partial accreditation certificate:

**Thermo Electron LED GmbH**  
**Robert-Bosch-Straße 1, 63505 Langenselbold**

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, if applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities listed below.

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

Additional site:

**Dieselstraße 13, 63579 Freigericht-Somborn**

*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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**Thermodynamic quantities**

**Temperature quantities**

- Climatic chambers (temperature) <sup>a)</sup>
- Resistance thermometers <sup>a)</sup>
- Direct reading thermometers <sup>a)</sup>
- Temperature transmitters, data loggers <sup>a)</sup>
- Temperature indicators and simulators

**Chemical analysis, reference materials**

- Volume of liquids

<sup>a)</sup> also on-site calibrations

**Within the measurands/calibration items marked with <sup>\*</sup>) 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.**

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**Site: Robert-Bosch-Straße 1, 63505 Langenselbold**
**Permanent Laboratory Robert-Bosch-Straße 1, 63505 Langenselbold**
**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature quantities Climatic chambers with/without air circulation*)	-90 °C to 0 °C	DKD-R 5-7:2018 Calibration methods A and B measurement in air	0,8 K	Comparison with standard resistance thermometers
	> 0 °C to 100 °C		0,5 K	
	> 100 °C to 200 °C		0,8 K	
	> 200 °C to 350 °C		1,2 K	
Measuring locations in climatic chambers with/without air circulation *)	-90 °C to 0 °C	DKD-R 5-7:2018 Calibration method C measurement in air	0,5 K	
	> 0 °C to 100 °C		0,3 K	
	> 100 °C to 200 °C		0,5 K	
	> 200 °C to 350 °C		0,8 K	
Resistance thermometers; direct reading thermometers, temperature transmitters and data loggers with resistance sensor *)	0 °C	DKD-R 5-1:2018 Ice point of Water	5 mK	Comparison with standard resistance thermometers
	-196 °C	DKD-R 5-1:2018 in liquid nitrogen (LN <sub>2</sub> ) with aluminum or brass compensation block	0,06 K	
	-90 °C to -62 °C	DKD-R 5-1:2018 in dry block calibrator	0,15 K	
	> -62 °C to -2 °C		0,1 K	
	> -2 °C to 152 °C		0,05 K	
	> 152 °C to 200 °C		0,1 K	
	> 200 °C to 300 °C		0,15 K	
	> 300 °C to 400 °C		0,2 K	
	10 °C to 70 °C		DKD-R 5-1:2018 in climatic chamber measurement in air	
4 °C to 95 °C	DKD-R 5-1:2018 in stirred liquid bath	0,05 K		

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**Permanent Laboratory Robert-Bosch-Straße 1, 63505 Langenselbold**

**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Direct reading thermometers, temperature transmitters and data loggers with thermocouple sensor *)	0 °C	DKD-R 5-3:2018 Ice point of water	0,25 K	Comparison with standard resistance thermometers
	-196 °C	DKD-R 5-3:2018 in liquid nitrogen (LN <sub>2</sub> ) with aluminum or brass compensation block	0,3 K	
	-90 °C to -62 °C	DKD-R 5-3:2018 in dry block calibrator	0,35 K	
	> -62 °C to -2 °C		0,3 K	
	> -2 °C to 152 °C		0,25 K	
	> 152 °C to 200 °C		0,3 K	
	10 °C to 70 °C	DKD-R 5-3:2018 in climatic chamber measurement in air	0,3 K	
	4 °C to 95 °C	DKD-R 5-3:2018 in stirred liquid bath	0,3 K	
Temperature indicators and simulators for resistance thermometers *)	-200 °C to 200 °C	DKD-R 5-5:2018	0,02 K	Characteristic curve according to DIN EN 60751:2009
	> 200 °C to 650 °C		0,03 K	
	> 650 °C to 850 °C		35 mK	
Temperature indicators and simulators for noble metal thermocouples Type S *)	0 °C to 1760 °C	DKD-R 5-5:2018 without internal reference junction	0,2 K	Characteristic curve according to DIN EN 60584:2014
	0 °C to 1760 °C	DKD-R 5-5:2018 with internal reference junction	0,3 K	
Temperature indicators and simulators for base metal thermocouples Type K *)	-200 °C to 1300 °C	DKD-R 5-5:2018 without internal reference junction	0,1 K	Characteristic curve according to DIN EN 60584:2014
	-200 °C to 1300 °C	DKD-R 5-5:2018 with internal reference junction	0,3 K	

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Site: Dieselstraße 13, 63579 Freigericht-Somborn

Permanent Laboratory Dieselstraße 13, 63579 Freigericht-Somborn

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement <sup>1)</sup>	Remarks
Volume of liquids Single channel piston pipettes *)	0,1 µL to < 1,0 µL	DIN EN ISO 8655-6:2002 and DKD-R 8-1:2011  Gravimetric method, adjusted by dispensing into the weighing vessel	8,0 % <sup>a)</sup> 6,0 % <sup>b)</sup> 4,0 % <sup>c)</sup>	The best measurement capability refers to the nominal volume. To state these uncertainty values the reference temperature shall be set equal to the temperature of the test liquid
	1,0 µL to < 10 µL		0,80 % <sup>a)</sup> 0,60 % <sup>b)</sup> 0,40 % <sup>c)</sup>	
	10 µL to < 100 µL		0,30 % <sup>a)</sup> 0,23 % <sup>b)</sup> 0,15 % <sup>c)</sup>	
	100 µL to < 1000 µL		0,15 % <sup>a)</sup> 0,11 % <sup>b)</sup> 0,075 % <sup>c)</sup>	
	1 mL to 10 mL		0,15 % <sup>a)</sup> 0,11 % <sup>b)</sup> 0,075 % <sup>c)</sup>	
Multichannel piston pipettes *)	1,0 µL to < 10 µL	DIN EN ISO 8655-6:2002 and DKD-R 8-2:2018  Gravimetric method, adjusted by dispensing into the weighing vessel	0,80 % <sup>a)</sup> 0,60 % <sup>b)</sup> 0,40 % <sup>c)</sup>	a) upper test volume: $(V_P = 1,0 \cdot V_N)$ for instruments with fixed volume or variable volume  b) Medium test volume: $(V_P = 0,5 \cdot V_N)$ for instruments with variable volume  c) Lower test volume: $(V_P = 0,1 \cdot V_N)$ for instruments with variable volume  $V_P =$ Test volume $V_N =$ Nominal volume
	10 µL to < 100 µL		0,35 % <sup>a)</sup> 0,27 % <sup>b)</sup> 0,18 % <sup>c)</sup>	
	100 µL to 1250 µL		0,18 % <sup>a)</sup> 0,14 % <sup>b)</sup> 0,09 % <sup>c)</sup>	
Multiple dispensers *)	2,0 µL to < 20 µL	DIN EN ISO 8655-6:2002 and DKD-R 8-2:2018  Gravimetric method, adjusted by dispensing into the weighing vessel	0,60 %	To state the best CMC value the reference temperature shall be set equal to the temperature of the test liquid
	20 µL to < 40 µL		0,40 %	
	40 µL to < 100 µL		0,30 %	
	100 µL to < 200 µL		0,20 %	
	200 µL to < 500 µL		0,15 %	
	500 µL to 1250 µL		0,10 %	
Single stroke dispensers *)	10 µL to < 1,0 mL	DIN EN ISO 8655-6:2002 and DKD-R 8-3:2020  Gravimetric method, adjusted by dispensing into the weighing vessel	0,20 %	
	1,0 mL to 100 mL		0,10 %	

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**On-site calibration**

**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature quantities Climatic chambers with/without air circulation *)	-90 °C to 0 °C	DKD-R 5-7:2018 Calibration methods A and B  measurement in air	0,8 K	Comparison with standard resistance thermometers
	> 0 °C to 100 °C		0,5 K	
	> 100 °C to 200 °C		0,8 K	
	> 200 °C to 350 °C		1,2 K	
Measuring locations in climatic chambers with/without air circulation*)	-90 °C to 0 °C	DKD-R 5-7:2018 Calibration method C  measurement in air	0,5 K	
	> 0 °C to 100 °C		0,3 K	
	> 100 °C to 200 °C		0,5 K	
	> 200 °C to 350 °C		0,8 K	
Resistance thermo- meters; direct reading thermometers, temperature trans- mitters and data loggers with resistance sensor *)	-90 °C to -62 °C	DKD-R 5-1:2018  in dry block calibrator	0,15 K	Comparison with standard resistance thermometers
	> -62 °C to -2 °C		0,1 K	
	> -2 °C to 152 °C		0,05 K	
	0 °C to 38 °C	DKD-R 5-1:2018  in humidity generator measurement in air	0,15 K	
	> 38 °C to 51 °C		0,2 K	

**Abbreviations used:**

CMC	Calibration and measurement capabilities
DIN	Deutsches Institut für Normung e.V.
DKD-R	Guideline of Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt (PTB)

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