

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-19781-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 17.02.2020

Date of issue: 17.02.2020

Holder of certificate:

**K. Meyer R.M.S. GmbH
Gotenweg 15 - 17, 58119 Hagen**

Calibration in the fields:

Thermodynamic quantities

Temperature quantities

- Resistance thermometers ^{a)}
- Thermocouples ^{a)}
- Direct reading thermometers ^{a)}
- Radiation thermometers
- Temperature indicators and simulators ^{a)}
- Climatic chambers (temperature) ^{a)}
- Temperature transmitters, data loggers ^{a)}

Humidity quantities

- Climatic chambers (humidity) ^{b)}

Electrical quantities

DC and low frequency quantities

- DC voltage
- DC current
- DC resistance

^{a)} also on-site calibration, ^{b)} only on-site calibration

Within the measurands/calibration items marked with *), 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.

Abbreviations used: see last page

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

Annex to the accreditation certificate D-K-19781-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Temperature Standard resistance thermometers *)	0,01 °C	triple point of water DKD-R 5-1:2018	3,5 mK	Calibration at fixed point temperatures
	156,5985 °C	freezing point of indium DKD-R 5-1:2018	20 mK	
	231,928 °C	freezing point of tin DKD-R 5-1:2018	20 mK	
	419,527 °C	freezing point of zinc DKD-R 5-1:2018	30 mK	
	660,323 °C	freezing point of aluminium DKD-R 5-1:2018	50 mK	
Resistance thermometers, direct reading thermometers with resistance sensor *)	-50 °C to 150 °C	in liquid bath DKD-R 5-1:2018	0,1 K	Comparison with standard resistance thermometer
	100 °C to 200 °C	in dry block calibrator DKD-R 5-1:2018	0,2 K	
	> 200 °C to 500 °C		0,5 K	
	> 500 °C to 650 °C		0,8 K	
	0 °C	ice point DKD-R 5-1:2018	5,0 mK	Using deionized water with an electrical conductivity < 10 µS/m
	0,01 °C	triple point of water DKD-R 5-1:2018	5,0 mK	Calibration at fixed point temperature
	-40 °C to 100 °C	in climatic chamber DKD-R 5-1:2018	1,5 K	Comparison with resistance thermometer
	> 100 °C to 180 °C		2,0 K	

¹⁾ The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Base metal thermocouples, direct reading thermometers with thermocouple sensor *)	0,01 °C	triple point of water DKD-R 5-3:2018	10 mK	Calibration at fixed point temperature
	-50 °C to 150 °C	in liquid bath DKD-R 5-3:2018	0,3 K	Comparison with standard resistance thermometer
	100 °C to 200 °C	in dry block calibrator DKD-R 5-3:2018	0,4 K	
	> 200 °C to 500 °C		0,8 K	
	> 500 °C to 650 °C	in furnace with compensation block DKD-R 5-3:2018	1,5 K	Comparison with standard thermocouple
	> 500 °C to 800 °C		1,8 K	
	> 800 °C to 1000 °C		2,5 K	
	> 1000 °C to 1300 °C		3,0 K	
Base metal thermocouples *)	0,01 °C	triple point of water DKD-R 5-3:2018	0,5 K	Calibration at fixed point temperature
	-50 °C to 150 °C	in liquid bath DKD-R 5-3:2018	0,5 K	Comparison with standard resistance thermometer
	> 150 °C to 650 °C	in dry block calibrator DKD-R 5-3:2018	1,0 K	
	> 500 °C to 800 °C	in furnace with compensation block DKD-R 5-3:2018	1,8 K	Comparison with standard thermocouple
	> 800 °C to 1000 °C		2,5 K	
	> 1000 °C to 1300 °C		3,0 K	
direct reading thermometers with thermocouple sensor *)	-40 °C to 100 °C	in climatic chamber DKD-R 5-3:2018	2,0	Comparison with resistance thermometer
	> 100 °C to 180 °C		2,5	
Liquid baths	-50 °C to 150 °C	KA007, Version 1.3	0,2 K	Comparison with standard resistance thermometer
	> 150 °C to 200 °C		0,3 K	

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Annex to the accreditation certificate D-K-19781-01-00

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Temperature data loggers with resistance sensor*)	-40 °C to 100 °C	in climatic chamber DKD-R 5-1:2018	2,0 K	Comparison with resistance thermometer
	> 100 °C to 180 °C		2,5 K	
Temperature data loggers with thermocouple sensor*)	-40 °C to 100 °C	in climatic chamber DKD-R 5-3:2018	3,0 K	
	> 100 °C to 180 °C		3,5 K	
Temperature indicators and simulators for resistance thermometers*)	-200 °C to 800 °C	DKD-R 5-5:2018	0,1 K	Basic values of resistance according to DIN EN 60751:2008
Temperature indicators and simulators for base metal thermocouples *)	-200 °C to 1300 °C	DKD-R 5-5:2018	0,3 K	Basic values of thermoelectric voltage according to
Temperature indicators and simulators for noble metal thermocouples *)	0 °C to 1500 °C	DKD-R 5-5:2018	0,4 K	DIN EN 60584-1:2014

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method C	1,5 K	Comparison with resistance thermometer or thermocouple If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 500 °C		3,0 K	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method A and B	1,5 K	
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 500 °C		3,0 K	
Measuring locations in climatic chambers without air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method C	1,5 K	
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 350 °C		3,0 K	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method A and B	3,0 K	
	> 0 °C to 100 °C		2,2 K	
	> 100 °C to 350 °C		5,0 K	
Radiation thermometers*)	35 °C to 100 °C	VDI/VDE 3511 Part 4.4:2005 calibration scheme IIa, spectral range 8 - 14 µm	2,0 K	Calibration against reference radiator
	> 100 °C to 300 °C		3,5 K	
	> 300 °C to 500 °C		5,0 K	

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DC Voltage Sources and measuring instruments	0,01 V to 0,1 V		$0,1 \text{ mV} + 0,02 \cdot 10^{-3} \cdot U$	U: measured value
	> 0,1 V to 1 V		$0,1 \text{ mV} + 0,02 \cdot 10^{-3} \cdot U$	
	> 1 V to 10 V		$0,2 \text{ mV} + 0,2 \cdot 10^{-3} \cdot U$	
	> 10 V to 100 V		$0,2 \text{ mV} + 0,2 \cdot 10^{-3} \cdot U$	
DC current Sources and measuring instruments	0,01 mA to 10 mA		$0,1 \text{ mA} + 0,2 \cdot 10^{-3} \cdot I$	I: measured value
	> 10 mA to 100 mA		$0,1 \text{ mA} + 0,2 \cdot 10^{-3} \cdot I$	
DC resistance Resistors and measuring instruments	0,1 mΩ to 4 kΩ		$0,5 \cdot 10^{-3} \cdot R$	R: measured value
	> 4 kΩ to 100 kΩ		$5 \cdot 10^{-3} \cdot R$	

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On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Temperature Temperature indicators, controllers, measuring and logging devices for resistance thermometers*)	-200 °C to 800 °C	DKD-R 5-5:2018	0,3 K	Basic values of resistance according to DIN EN 60751:2008
Temperature indicators, controllers, measuring and logging devices for base metal thermocouples *)	-100 °C to 1350 °C	DKD-R 5-5:2018	0,6 K	Basic values of thermoelectric voltage according to DIN EN 60584-1:2014
Temperature indicators, controllers, measuring and logging devices for noble metal thermocouples *)	0 °C to 1450 °C	DKD-R 5-5:2018	0,6 K	
Resistance thermometers, direct reading thermometers with resistance sensor *)	-30 °C to 150 °C	in liquid bath DKD-R 5-1:2018	0,4 K	Comparison with standard resistance thermometer
	-50 °C to 200 °C	in dry block calibrator DKD-R 5-1:2018	0,8 K	
	> 200 °C to 650 °C		2,5 K	
Thermocouples, direct reading thermometers with thermocouple sensor *)	-30 °C to 150 °C	in liquid bath DKD-R 5-3:2018	0,6 K	
	-50 °C to 200 °C	in dry block calibrator DKD-R 5-3:2018	1,0 K	
	> 200 °C to 650 °C		2,5 K	

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Annex to the accreditation certificate D-K-19781-01-00

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method C	1,5 K	Comparison with resistance thermometer or thermocouple If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 500 °C		3,0 K	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method A and B	1,5 K	
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 500 °C		3,0 K	
Measuring locations in climatic chambers without air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method C	1,5 K	
	> 0 °C to 100 °C		1,5 K	
	> 100 °C to 200 °C		1,5 K	
	> 200 °C to 350 °C		3,0 K	
Climatic chambers without air circulation in empty or defined loaded useful volume *)	-50°C to 0 °C	Measurement in air DKD-R 5-7:2018 method A and B	3,0 K	
	> 0 °C to 100 °C		2,2 K	
	> 100 °C to 350 °C		5,0 K	

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On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Relative humidity Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 50 %	Air temperature: 10 °C bis 80 °C DKD-R 5-7:2018 method C	4,5 %	Measurement with capacitive reference humidity sensor If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate
	> 50 % to 95 %		5,0 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 50 %	Air temperature: 10 °C bis 80 °C DKD-R 5-7:2018 method A and B	4,5 %	The measurement uncertainty is an absolute value of relative humidity
	> 50 % to 95 %		5,0 %	

Abbreviations used:

CMC	Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DKD-R	Calibration Guide of Deutscher Kalibrierdienst (DKD), published by the Physikalisch-Technischen Bundesanstalt
KA	inhouse procedure of K. Meyer R.M.S. GmbH

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