

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15223-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 09.12.2022

Date of issue: 09.12.2022

Holder of accreditation certificate:

Ludwig Schneider Messtechnik GmbH
Am Eichamt 4, 97877 Wertheim

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.

Calibration in the fields:

Thermodynamic Quantities

Temperature Quantities

- Resistance thermometers
- Thermocouples
- Temperature block calibrators
- Fixed-point cells
- Direct reading thermometers
- Liquid-in-glass thermometers

Temperature Quantities (Continuation)

- Mechanical thermometers
- Temperature indicators and simulators
- Temperature transmitters, data loggers
- Calibration baths ^{a)}

Chemical analysis, reference materials

- Density of liquids

^{a)} also 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.

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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This document is a translation. The definitive version is the original German annex to the accreditation certificate.

Annex to the Accreditation Certificate D-K-15223-01-00
Permanent Laboratory
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature Fixed-point cells *)	0,01 °C	G-ITS-90, Part 2.2:2018 triple point of water	1 mK	Comparison with reference fixed-point cell
Standard platinum resistance thermometers (SPRT) *)	0,00 °C	ice point	5 mK	Calibration at fixed point temperatures
	0,010 °C	G-ITS-90, Part 2.2:2018 triple point of water	2 mK	
	29,7646 °C	G-ITS-90, Part 2.4:2021 melting point of gallium	2,5 mK	
Resistance thermometers, Direct reading thermometers and measuring chains with resistance sensor *)	-196 °C	DKD-R 5-1:2018 in liquid nitrogen	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	DKD-R 5-1:2018 in calibration baths	20 mK	
	> 0 °C to 300 °C		10 mK	
	> 300 °C to 500 °C		50 mK	
	> 500 °C to 660 °C		0,1 K	
Base metal thermocouples, direct reading thermometers and measuring chains with base metal thermocouples *)	-196 °C	DKD-R 5-3:2018 in liquid nitrogen	1 K	Comparison with standard resistance thermometers
	-90 °C to 300 °C	DKD-R 5-3:2018 in calibration baths	0,5 K	
	> 300 °C to 660 °C		1 K	
	> 660 °C to 1000 °C	DKD-R 5-3:2018 in tube furnaces	1,5 K	Comparison with standard thermocouples
	> 1000 °C to 1200 °C		2 K	
	> 1200 °C to 1300 °C		3 K	
Noble metal thermocouples, direct reading thermometers and measuring chains with noble metal thermocouples *)	0 °C to 200 °C	DKD-R 5-3:2018 in calibration baths	0,3 K	Comparison with standard resistance thermometers
	> 200 °C to 660 °C		0,5 K	
	> 660 °C to 1000 °C	DKD-R 5-3:2018 in tube furnaces	1 K	Comparison with standard thermocouples
	> 1000 °C to 1200 °C		1,5 K	
	> 1200 °C to 1300 °C		2 K	
Measuring transducers with resistance thermometer *)	-196 °C	DKD-R 5-1:2018 in liquid nitrogen	$U_{PRT} + 0,1 \text{ K}$	Comparison with standard resistance thermometers U_{PRT} is the expanded measurement uncertainty from the calibration of the resistance thermometer only
	-90 °C to 660 °C	DKD-R 5-1:2018 in calibration baths		
Measuring transducers with thermocouple *)	-196 °C	DKD-R 5-3:2018 in liquid nitrogen	$U_{TC} + 0,5 \text{ K}$	Comparison with standard resistance thermometers or standard thermocouples U_{TC} is the expanded measurement uncertainty from the calibration of the thermocouple only
	-90 °C to 660 °C	DKD-R 5-3:2018 in calibration baths		
	> 660 °C to 1300 °C	DKD-R 5-3:2018 in tube furnaces		

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature block calibrators *)	-30 °C to < 0 °C	DKD-R 5-4:2018	0,20 K	Comparison with standard resistance thermometers
	0 °C to 150 °C		0,07 K	
	> 150 °C to 350 °C		0,13 K	
	> 350 °C to 550 °C		0,17 K	
	> 550 °C to 660 °C		0,22 K	Comparison with standard thermocouples
	0 °C to 660 °C		1,5 K	
	> 660 °C to 1000 °C		4 K	
	> 1000 °C to 1300 °C		6 K	
Mechanical thermometers	-196 °C	QMP 10.8.1, Rev. 1 in liquid nitrogen	0,1 K (min. ½ of the scale interval)	Comparison with standard resistance thermometers
	-90 °C to 660 °C	QMP 10.8.1, Rev. 1 in calibration baths		
Liquid-in glass thermometers	-196 °C	QMP 10.3.1, Rev. 1 in liquid nitrogen	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	QMP 10.3.1, Rev. 1 in calibration baths	20 mK	
	> 0 °C to 300 °C		10 mK	
	> 300 °C to 500 °C		50 mK	
	> 500 °C to 660 °C		0,1 K	
Micro baths, precision baths and calibration baths, thermostats	-80 °C to 60 °C	QMP 10.7.1, Rev. 2	10 mK	Comparison with precision resistance thermometers
	> 60 °C to 250 °C		15 mK	
Temperature indicators and simulators for resistance thermometers *)	-200 °C to 850 °C	DKD-R 5-5:2018	2 mK	Characteristic curve according to DIN EN 60751:2009
Temperature indicators and simulators for base metal thermocouples *)	-270 °C to 1370 °C	DKD-R 5-5:2018	0,1 K	Characteristic curve according to DIN EN 60584-01:2014 without reference junction compensation
Temperature indicators and simulators for noble metal thermocouples *)	-50 °C to 1820 °C	DKD-R 5-5:2018	0,2 K	Characteristic curve according to DIN EN 60584-01:2014 without reference junction compensation
Density of liquids Hydrometers and derived instruments	450 kg/m ³ to 2000 kg/m ³	QMP 10.11.1, Rev. 2	0,04 kg/m ³	
Alcoholometers	0 % to 100 %	QMP 10.11.1, Rev. 2	0,016 %	no relative uncertainty of measurement
Saccharimeters	0 % to 70 %	QMP 10.11.1, Rev. 2	0,012 %	

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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
Micro baths, precision baths and calibration baths, thermostats	-80 °C to 60 °C	QMP 10.7.2, Rev. 1	10 mK	Comparison with precision resistance thermometers
	> 60 °C to 250 °C		15 mK	

Abbreviations used:

- CMC Calibration and measurement capabilities
- DKD-R Guideline of Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt
- G-ITS-90, Part 2.2 Guide to the Realization of the ITS-90, Triple Point of Water
- G-ITS-90, Part 2.4 Guide to the Realization of the ITS-90, Metal Fixed Points for Contact Thermometry
- QMP Procedure of Ludwig Schneider Messtechnik GmbH

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