

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Annex to the Accreditation Certificate D-K-15223-01-00
according to DIN EN ISO/IEC 17025:2005

Period of validity: 13.07.2018 to 17.11.2021 Date of issue: 13.07.2018

Holder of certificate:

Ludwig Schneider Messtechnik GmbH
Am Eichamt 4, 97877 Wertheim

Head: Andreas Bleifuß
Deputy: Lilia Wittenbeck
Cornelia Wießler-Rempt

Accredited as calibration laboratory since: 1991-03-22

Calibrations in the fields:

Thermodynamic quantities

Temperature quantities

- Resistance thermometers
- Thermocouples
- Temperature block calibrators
- Fixed-point cells
- Direct reading thermometers
- Liquid-in-glass thermometers
- Mechanical thermometers
- Temperature indicators and simulators
- Temperature transmitters, data loggers

Chemical analysis, reference materials

- Density of liquids

Abbreviations used: see last page

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.

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Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Temperature				
Fixed-point cells	0,01 °C	triple point of water	1 mK	Comparison with reference fixed-point cell
Standard platinum resistance thermometers	0,00 °C	ice point	5 mK	Calibration at fixed points temperatures
	0,010 °C	triple point of water	2 mK	
	29,7646 °C	melting point of gallium	2,5 mK	
Resistance thermometers ^{*)} , Direct reading thermometers and measuring chains with resistance sensor ^{*)}	-196 °C	in liquid nitrogen DAKKS-DKD-R 5-1:2010	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	in calibration baths DAKKS-DKD-R 5-1:2010	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	in liquid nitrogen DAKKS-DKD-R 5-3:2010	1 K	Comparison with standard resistance thermometers
	-90 °C to 300 °C	in calibration baths DAKKS-DKD-R 5-3:2010	0,5 K	
	> 300 °C to 660 °C		1 K	
	> 660 °C to 1000 °C	in tube furnaces DAKKS-DKD-R 5-3:2010	1,5 K	Comparison with standard thermocouples
	> 1000 °C to 1200 °C		2 K	
	> 1200 °C to 1300 °C		3 K	
Rare metal thermocouples ^{*)} , Direct reading thermometers and measuring chains with rare metal thermocouples ^{*)}	0 °C to 200 °C	in calibration baths DAKKS-DKD-R 5-3:2010	0,3 K	Comparison with standard resistance thermometers
	> 200 °C to 660 °C		0,5 K	
	> 660 °C to 1000 °C	in tube furnaces DAKKS-DKD-R 5-3:2010	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	in liquid nitrogen DAKKS-DKD-R 5-1:2010	$U_{PRT} + 0,1 \text{ K}$	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	in calibration baths DAKKS-DKD-R 5-1:2010		
Measuring transducers with thermocouple ^{*)}	-196 °C	in liquid nitrogen DAKKS-DKD-R 5-3:2010	$U_{TC} + 0,5 \text{ K}$	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	in calibration baths DAKKS-DKD-R 5-3:2010		
	> 660 °C to 1300 °C	in tube furnaces DAKKS-DKD-R 5-3:2010		

¹⁾ The best measurement capabilities are stated according to EA-4/02. These are expanded uncertainties of measurement with a coverage probability of 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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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Temperature block calibrators *)	-30 °C to 133 °C	DAkkS-DKD-R 5-4:2010	0,20 K	Comparison with standard resistance thermometers; $t = \text{measured value in } ^\circ\text{C}$
	> 133 °C to 660 °C		1,5 mK · t / °C	
	0 °C to 660 °C		1,5 K	Comparison with standard thermocouples
	> 660 °C to 1000 °C		4 K	
	> 1000 °C to 1300 °C		6 K	
Mechanical thermometers	-196 °C	in liquid nitrogen LSM-QMV 5.04/17 Ind. 1	0,1 K (min. 1/2 of the scale interval)	Comparison with standard resistance thermometers
	-90 °C to 660 °C	in calibration baths LSM-QMV 5.04/17 Ind. 1		
Liquid-in glass thermometers	-196 °C	in liquid nitrogen PTB-Testing Instructions Volume 2:1999	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	in calibration baths PTB-Testing Instructions Volume 2:1999	20 mK	
	> 0 °C to 300 °C		10 mK	
	> 300 °C to 500 °C		50 mK	
	> 500 °C to 660 °C		0,1 K	
Precision baths and calibration baths, thermostats	-60 °C to 60 °C	LSM-QMV 5.04/16 Index 2	10 mK	Comparison with precision or standard resistance thermometers
	> 60 °C to 250 °C		15 mK	
Precision baths and calibration baths, thermostats	-60 °C to 60 °C	LSM-QMV 5.04/16 Index 2	10 mK	Comparison with precision or standard resistance thermometers
Temperature indicators and simulators for resistance thermometers *)	-200 °C to 850 °C	DAkkS-DKD-R 5-5:2010	2 mK	Characteristic curve according to DIN EN 60751:2009
Temperature indicators and simulators for base metal thermocouples *)	-270 °C to 1370 °C	DAkkS-DKD-R 5-5:2010	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	DAkkS-DKD-R 5-5:2010	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	hydrostatic method	0,04 kg/m ³	
Alcoholometers	0 % to 100 %	hydrostatic method	0,016 %	no relative uncertainty of measurement
Saccharimeters	0 % to 70 %	hydrostatic method	0,012 %	

Abbreviations used:

DAkkS-DKD-R Calibration Guide of Deutsche Akkreditierungsstelle GmbH
 LSM - QMV Procedure of Ludwig Schneider Messtechnik GmbH

¹⁾ The best measurement capabilities are stated according to EA-4/02. These are expanded uncertainties of measurement with a coverage probability of 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.