

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-17677-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 20.02.2020

Date of issue: 20.02.2020

Holder of certificate:

Reckmann Gesellschaft mit beschränkter Haftung

with its calibration laboratory

Mess + Regeltechnik

Werkzeugstraße 19-23, 58093 Hagen

Calibration in the fields:

Thermodynamic quantities

Temperature quantities

- Resistance thermometers ^{a)}
- Thermocouples ^{a)}
- Direct reading thermometers
- Temperature indicators and simulators ^{a)}

^{a)} also on-site calibration

Abbreviations used: see last page.

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.

*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-17677-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Temperature Resistance thermometers, direct reading thermometers or measuring chains with resistance sensor	-50 °C to 100 °C	in calibration bath DKD-R 5-1:2018	50 mK	Comparison with standard resistance thermometers
	95 °C to 200 °C	in calibration bath DKD-R 5-1:2018	50 mK	
	200 °C to 550 °C	in salt bath DKD-R 5-1:2018	0,1 K	
	0,01 °C	triple point of water DKD-R 5-1:2018	25 mK	Calibration at fixed points temperatures
	29,7646 °C	melting point of gallium DKD-R 5-1:2018	25 mK	
	231,928 °C	melting point of tin DKD-R 5-1:2018	25 mK	
	419,527 °C	melting point of zinc DKD-R 5-1:2018	25 mK	
	660,323 °C	melting point of aluminium DKD-R 5-1:2018	70 mK	
Noble metal thermocouples, direct reading thermometers or measuring chains with thermocouple sensor	-50 °C to 100 °C	in calibration bath DKD-R 5-3:2018	0,3 K	Comparison with standard resistance thermometers
	95 °C to 200 °C	in calibration bath DKD-R 5-3:2018	0,3 K	
	200 °C to 300 °C	in salt bath DKD-R 5-3:2018	0,3 K	
	> 300 °C to 550 °C		1,0 K	
	50 °C to 1100 °C	in tube furnace DKD-R 5-3:2018	1,3 K	Comparison with standard thermocouples
	> 1100 °C to 1200 °C		2,3 K	
	> 1200 °C to 1400 °C		2,5 K	
	> 1400 °C to 1600 °C		3,5 K	
	660,323 °C	melting point of aluminium DKD-R 5-3:2018	0,5 K	Calibration at fixed point temperatures
	961,78 °C	freezing point of silver DKD-R 5-3:2018	0,6 K	
1084,62 °C	freezing point of copper DKD-R 5-3:2018	0,7 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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Permanent Laboratory

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 or measuring chains with thermocouple sensor	-50 °C to 100 °C	in calibration bath DKD-R 5-3:2018	0,3 K	Comparison with standard resistance thermometers
	95 °C to 200 °C	in calibration bath DKD-R 5-3:2018	0,3 K	
	200 °C to 300 °C	in salt bath DKD-R 5-3:2018	0,3 K	
	> 300 °C to 550 °C		1,0 K	
	50 °C to 1100 °C	in tube furnace DKD-R 5-3:2018	1,5 K	Comparison with standard thermocouples
	> 1100 °C to 1200 °C		2,5 K	
	> 1200 °C to 1300 °C		3,5 K	
	660,323 °C	melting point of aluminium DKD-R 5-3:2018	0,6 K	Calibration at fixed point temperatures
	961,78 °C	freezing point of silver DKD-R 5-3:2018	0,8 K	
1084,62 °C	freezing point of copper DKD-R 5-3:2018	0,9 K		
Temperature indicators and simulators for resistance thermometers	-200 °C to 850 °C	DKD-R 5-5:2018	50 mK	Basic values of resistance according to DIN EN 60751:2008
Temperature indicators and simulators for noble metal thermocouples	-50 °C to 1820 °C	DKD-R 5-5:2018	0,4 K	Basic values of thermoelectric voltage according to DIN EN 60584-1:2014
Temperature indicators and simulators for base metal thermocouples	-270 °C to 1370 °C	DKD-R 5-5:2018	0,4 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
Temperature Resistance-thermometers	-50 °C to 100 °C	in metal block calibrator DKD-R 5-1:2018	0,3 K	Comparison with standard resistance-thermometers
	> 100 °C to 200 °C		0,4 K	
	> 200 °C to 300 °C		0,6 K	
	> 300 °C to 650 °C		1,0 K	
Noble metal thermocouples	-50 °C to 100 °C	in metal block calibrator DKD-R 5-3:2018	0,7 K	
	> 100 °C to 200 °C		0,8 K	
	> 200 °C to 300 °C		0,9 K	
	> 300 °C to 650 °C		1,3 K	
Base metal thermocouples	-50 °C to 100 °C	in metal block calibrator DKD-R 5-3:2018	0,7 K	
	> 100 °C to 200 °C		0,8 K	
	> 200 °C to 300 °C		0,9 K	
	> 300 °C to 650 °C		1,3 K	
Temperature indicators and simulators for resistance thermometers	-200 °C to 850 °C	DKD-R 5-5:2018	0,1 K	Basic values of resistance according to DIN EN 60751:2008
Temperature indicators and simulators for noble metal thermocouples	-50 °C to 1820 °C	DKD-R 5-5:2018	0,6 K	Basic values of thermoelectric voltage according to DIN EN 60584-1:2014
Temperature indicators and simulators for base metal thermocouples	-270 °C to 1370 °C	DKD-R 5-5:2018	0,6 K	

Abbreviations used:

CMC Calibration and measurement capabilities
 DKD-R Calibration Guide of Deutscher Kalibrierdienst (DKD), published by the Physikalisch-Technischen Bundesanstalt

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.