

# Deutsche Akkreditierungsstelle GmbH

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

**Valid from: 14.02.2020**

Date of issue: 14.02.2020

Holder of certificate:

**Ludwig Schneider Messtechnik GmbH  
Am Eichamt 4, 97877 Wertheim**

Calibration 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 <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.**

*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-15223-01-00**

**Permanent Laboratory**

**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement <sup>1)</sup>	Remarks
<b>Temperature</b>				
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 <sup>*)</sup> , Direct reading thermometers and measuring chains with resistance sensor <sup>*)</sup>	-196 °C	in liquid nitrogen DKD-R 5-1:2018	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	in calibration baths DKD-R 5-1:2018	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 <sup>*)</sup> , Direct reading thermometers and measuring chains with base metal thermocouples <sup>*)</sup>	-196 °C	in liquid nitrogen DKD-R 5-3:2018	1 K	Comparison with standard resistance thermometers
	-90 °C to 300 °C	in calibration baths DKD-R 5-3:2018	0,5 K	
	> 300 °C to 660 °C		1 K	
	> 660 °C to 1000 °C	in tube furnaces DKD-R 5-3:2018	1,5 K	Comparison with standard thermocouples
	> 1000 °C to 1200 °C		2 K	
	> 1200 °C to 1300 °C		3 K	
Noble metal thermocouples <sup>*)</sup> , Direct reading thermometers and measuring chains with noble metal thermocouples <sup>*)</sup>	0 °C to 200 °C	in calibration baths DKD-R 5-3:2018	0,3 K	Comparison with standard resistance thermometers
	> 200 °C to 660 °C		0,5 K	
	> 660 °C to 1000 °C	in tube furnaces DKD-R 5-3:2018	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 <sup>*)</sup>	-196 °C	in liquid nitrogen DKD-R 5-1:2018	$U_{PRT} + 0,1 \text{ K}$	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 DKD-R 5-1:2018		
Measuring transducers with thermocouple <sup>*)</sup>	-196 °C	in liquid nitrogen DKD-R 5-3:2018	$U_{TC} + 0,5 \text{ K}$	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 DKD-R 5-3:2018		
	> 660 °C to 1300 °C	in tube furnaces DKD-R 5-3:2018		

<sup>1)</sup> 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.

**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 <sup>1)</sup>	Remarks
Temperature block calibrators *)	-30 °C to 133 °C	DKD-R 5-4:2018	0,20 K	Comparison with standard resistance thermometers; $t =$ measured value in °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 QMP 10.8.1, Rev. 1	0,1 K (min. ½ of the scale interval)	Comparison with standard resistance thermometers
	-90 °C to 660 °C	in calibration baths QMP 10.8.1, Rev. 1		
Liquid-in glass thermometers	-196 °C	in liquid nitrogen QMP 10.3.1, Rev. 1	50 mK	Comparison with standard resistance thermometers
	-90 °C to 0 °C	in calibration baths QMP 10.3.1, Rev. 1	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	-60 °C to 60 °C	QMP 10.7.1, Rev. 1	10 mK	Comparison with precision or standard 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
<b>Density of liquids</b>				
Hydrometers and derived instruments	450 kg/m <sup>3</sup> to 2000 kg/m <sup>3</sup>	QMP 10.11.1, Rev. 2	0,04 kg/m <sup>3</sup>	
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 %	

**Abbreviations used:**

CMC	Calibration and measurement capabilities
QMP	Procedure of Ludwig Schneider Messtechnik GmbH
DKD-R	Guideline of Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt

<sup>1)</sup> 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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