

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-17099-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 20.08.2020

Date of issue: 20.08.2020

Holder of certificate:

Vötsch Industrietechnik GmbH
Beethovenstraße 34, 72336 Balingen-Frommern

Calibration in the fields:

Thermodynamic quantities

Temperature quantities

- Resistance thermometers
- Direct reading thermometers
- Temperature transmitters, data loggers
- Climatic chambers (temperature) ^{a)}

Humidity quantities

- Devices for absolute humidity
- Devices for relative humidity
- Climatic chambers (humidity) ^{a)}

^{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.

Abbreviations used: see last page

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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
Temperature Resistance thermometers; Indicating thermometers, Measuring transducer and data logger with resistance sensor *)	-80 °C to -40 °C	in liquid bath DKD-R 5-1:2018	0,10 K	Comparison with reference thermometer
	> -40 °C to 0 °C		0,06 K	
	> 0 °C to 100 °C		0,04 K	
	> 100 °C to 200 °C		0,06 K	
	100 °C to 350 °C	in dry block calibrator DKD-R 5-1:2018	0,15 K	
	-80 °C to -40 °C	in calibration test chamber (measurement in air) DKD-R 5-1:2018	0,12 K	
	> -40 °C to 0 °C		0,10 K	
	> 0 °C to 100 °C		0,08 K	
> 100 °C to 150 °C	0,12 K			
> 150 °C to 200 °C	0,18 K			
Indicating thermometers, Measuring transducer and data logger with base metal thermocouple sensor *)	- 80 °C to 100 °C	in liquid bath or in calibration test chamber (measurement in air) DKD-R 5-3:2018	0,25 K	Comparison with reference thermometer
	> 100 °C to 200 °C		0,35 K	
	> 100 °C to 200 °C	in metal block calibrator DKD-R 5-3:2018	0,35 K	
	> 200 °C to 350 °C		0,45 K	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method C	0,15 K	Measurement with reference thermometer If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> -40 °C to 0 °C		0,12 K	
	> 0 °C to 100 °C		0,08 K	
	> 100 °C to 150 °C		0,13 K	
	> 150 °C to 200 °C		0,20 K	
	> 200 °C to 350 °C		0,33 K	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method A and B	0,5 K	
	> -40 °C to 0 °C		0,4 K	
	> 0 °C to 100 °C		0,2 K	
	> 100 °C to 150 °C		0,4 K	
	> 150 °C to 200 °C		0,6 K	
	> 200 °C to 350 °C		1,7 K	
Measuring locations in climatic chambers without air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method C	0,5 K	
	> -40 °C to 0 °C		0,4 K	
	> 0 °C to 100 °C		0,3 K	
	> 100 °C to 150 °C		0,4 K	
	> 150 °C to 200 °C		0,5 K	
	> 200 °C to 350 °C		0,8 K	
Climatic chambers without air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method A and B	3,0 K	
	> -40 °C to 0 °C		2,0 K	
	> 0 °C to 100 °C		2,2 K	
	> 100 °C to 150 °C		3,0 K	
	> 150 °C to 200 °C		3,5 K	
	> 200 °C to 350 °C		5,0 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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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Dew point temperature Dew point hygrometers	-30 °C to 95 °C	in calibration test chamber PB-D-000014, Rev. 6	0,1 K	Comparison with reference dew point hygrometer
Relative humidity Hygrometric sensors and transducers	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) PB-D-000015, Rev. 7	0,4 %	The humidity reference is calculated from the dew point and air temperature, each measured with reference instruments. The measurement uncertainty is an absolute value of relative humidity.
	> 30 % to 60 %		0,6 %	
	> 60 % to 98 %		0,8 %	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method C	0,4 %	The humidity reference is calculated from the dew point and air temperature, each measured with reference instruments.
	> 30 % to 60 %		0,6 %	
	> 60 % to 98 %		0,8 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method A and B	0,8 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,2 %	
	> 60 % to 98 %		1,6 %	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 30 %	Air temperature: 10 °C to 95 °C DKD-R 5-7:2018 Method C	1,0 %	Measurement with reference aspiration psychrometer. If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,2 %	
	> 60 % to 98 %		1,4 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 30 %	Air temperature: 10 °C to 95 °C DKD-R 5-7:2018 Method A and B	1,6 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		2,0 %	
	> 60 % to 98 %		2,4 %	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method C	1,3 %	Measurement with capacitive reference humidity sensor If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,4 %	
	> 60 % to 98 %		1,6 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method A and B	1,9 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		2,2 %	
	> 60 % to 98 %		2,6 %	

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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 Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method C	0,15 K	Measurement with reference thermometer If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> -40 °C to 0 °C		0,12 K	
	> 0 °C to 100 °C		0,08 K	
	> 100 °C to 150 °C		0,13 K	
	> 150 °C to 200 °C		0,20 K	
	> 200 °C to 350 °C		0,33 K	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method A and B	0,5 K	
	> -40 °C to 0 °C		0,4 K	
	> 0 °C to 100 °C		0,2 K	
	> 100 °C to 150 °C		0,4 K	
	> 150 °C to 200 °C		0,6 K	
	> 200 °C to 350 °C		1,7 K	
Measuring locations in climatic chambers without air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method C	0,5 K	
	> -40 °C to 0 °C		0,4 K	
	> 0 °C to 100 °C		0,3 K	
	> 100 °C to 150 °C		0,4 K	
	> 150 °C to 200 °C		0,5 K	
	> 200 °C to 350 °C		0,8 K	
Climatic chambers without air circulation in empty or defined loaded useful volume *)	-80 °C to -40 °C	Measurement in air DKD-R 5-7:2018 Method A and B	3,0 K	
	> -40 °C to 0 °C		2,0 K	
	> 0 °C to 100 °C		2,2 K	
	> 100 °C to 150 °C		3,0 K	
	> 150 °C to 200 °C		3,5 K	
	> 200 °C to 350 °C		5,0 K	

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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 *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method C	0,4 %	The humidity reference is calculated from the dew point and air temperature, each measured with reference instruments.
	> 30 % to 60 %		0,6 %	
	> 60 % to 98 %		0,8 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method A and B	0,8 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,2 %	
	> 60 % to 98 %		1,6 %	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 30 %	Air temperature: 10 °C to 95 °C DKD-R 5-7:2018 Method C	1,0 %	Measurement with reference aspiration psychrometer. If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,2 %	
	> 60 % to 98 %		1,4 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	10 % to 30 %	Air temperature: 10 °C to 95 °C DKD-R 5-7:2018 Method A and B	1,6 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		2,0 %	
	> 60 % to 98 %		2,4 %	
Measuring locations in climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method C	1,3 %	Measurement with capacitive reference humidity sensor If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		1,4 %	
	> 60 % to 98 %		1,6 %	
Climatic chambers with air circulation in empty or defined loaded useful volume *)	5 % to 30 %	Air temperature: 5 °C to 140 °C (max 95 °C dew point temperature) DKD-R 5-7:2018 Method A and B	1,9 %	If loaded, type and arrangement of the load are to be precisely stated in the calibration certificate.
	> 30 % to 60 %		2,2 %	
	> 60 % to 98 %		2,6 %	

Abbreviations used:

- DKD-R Calibration Guideline of Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt
- PB-D Process description of Vötsch Industrietechnik GmbH

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