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Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-15077-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **30.06.2022**

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Holder of certificate:

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Calibration in the fields:

Dimensional quantities

Length

- **Gauge blocks**
- **Length measuring instruments**
- **Length measuring devices** [a)]
- **Diameter**
- **Form error**

[a)] also on-site calibration

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories. Laboratories that conform to the requirements of this standard, operate generally in accordance with the principles of DIN EN ISO 9001.

The certificate together with the annex 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/en/accredited-bodies-search.html.

Abbreviations used: see last page

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length				
Gauge blocks made of steel according to DIN EN ISO 3650:1999	0.5 mm to 100 mm must be of the same nominal length	VDI/VDE/DGQ 2618 part 3.1:2004 Measurement of the deviation of the central length l_c from the nominal value l_n by comparison measurement Measurement of the deviations f_o and f_u from the central length by 5 points comparison measurement	For the central length: $0.05\ \mu m + 0.5 \cdot 10^{-6} \cdot l$ for the deviation f_o and f_u from the central length: 0.05 µm	l = gauge block length Quality of the measuring surface according to the commitments in the Laboratory Quality Manuel rsp. in the calibration procedures
	0.5 mm to 100 mm Unusual nominal length using a laser interferometric probe, type SIOS LM 20, with a reference gauge block which nominal size does not differ more than 10 mm from the test specimen		For the central length: $0.05\ \mu m + 0.5 \cdot 10^{-6} \cdot l$ for the deviation f_o and f_u from the central length: 0.05 µm	
Gauge blocks made of ceramics or tungsten carbide according to DIN EN ISO 3650:1999	0.5 mm to 100 mm must be of the same nominal length		For the central length: $0.07\ \mu m + 0.6 \cdot 10^{-6} \cdot l$ for the deviation f_o and f_u from the central length: 0.05 µm	
	0.5 mm to 100 mm Unusual nominal length using a laser interferometric probe, type SIOS LM 20, with a reference gauge block which nominal size does not differ more than 10 mm from the test specimen		For the central length: $0.07\ \mu m + 0.6 \cdot 10^{-6} \cdot l$ for the deviation f_o and f_u from the central length: 0.05 µm	
Gauge blocks made of steel according to DIN EN ISO 3650:1999	100 mm to 1000 mm must be of the same nominal length	VDI/VDE/DGQ 2618 part 3.1:2004 Measurement of the deviation of the central length l_c from the nominal value l_n by comparison measurement Interferential measurement of the deviations f_o and f_u from the central length	For the central length: $0.05\ \mu m + 0.5 \cdot 10^{-6} \cdot l$ for the deviation f_o and f_u from the central length: 0.05 µm	

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Gauge blocks made of steel or tungsten carbide according to DIN EN ISO 3650:1999	0.1 mm to < 0.5 mm must be of the same nominal length	VDI/VDE/DGQ 2618 part 3.1:2004 Measurement of the deviation of the central length l_c from the nominal value l_n by comparison measure-ment For the smallest measurement uncertainties, the wringability and the wringing characteristics of both measuring surfaces must be checked using an appropriate optical flat	For the mean size: 0.15 µm	
Pairs of gauge blocks made of steel or tungsten carbide according to DIN EN ISO 3650:1999	0.5 mm to 100 mm	VDI/VDE/DGQ 2618 part 3.1:2004 Measurement of the difference of the central lengths for pairs of gauge blocks with the same nominal length, respectively of difference of the central lengths up to 10 µm Measurement of the deviations f_0 and f_u from the central length by 5 points comparison measurement	For the difference of the central length of the pairs: 0.03 µm For the deviation from the central length: 0.03 µm (only for the nominal values 1.005 mm and 1.01 mm) else 0.05 µm	
Step-height Step-height-standard consisting of a plane-parallel plate with wrung gauge blocks made of tungsten carbide according to DIN EN ISO 3650:1999	0 mm to 25 mm	QM-APA 8.5.1.001.019: 2021-11 Option 1: The step height h is determined from the difference between measurements for the centre length Option 2: The step height h is determined by absolute measurement using a laser interferometric probe, type SIOS LM 20, referring to the reference plane	For the step-height: 0.10 µm	Ensuring the wringing of the gauge blocks on the base plate is done by interferential measurement of parallelism of the steps relating to the base plate
Gauge block comparator for calibration of gauge blocks	0.5 mm to 100 mm	DKD-R 4-1:2018	0.03 µm + 0.002 · D	$D \leq 10$ µm, for nominal length difference

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range			Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Micrometers		to	300 mm	VDI/VDE/DGQ 2618 Part 10.1:2001	3 µm + 10 · 10^{-6} · l	l = measured length
	> 300 mm	to	1000 mm		5 µm + 10 · 10^{-6} · l	
Dial gauges		to	100 mm	VDI/VDE/DGQ/DKD 2618 Part 11.1:2021	3 µm + 10 · 10^{-6} · l	over 30 mm in the horizontal position
Dial gauges		to	3 mm	VDI/VDE/DGQ 2618 Part 11.2:2002	0.6 µm	
Lever gauges		to	1.6 mm	VDI/VDE/DGQ 2618 Part 11.3:2002	0.8 µm	
Digital indicator		bis	100 mm	VDI/VDE/DGQ/DKD 2618 Part 11.4:2020	3 µm + 10 · 10^{-6} · l	larger 30 mm in horizontal position only
Plug gauges Diameter	0.5 mm	to	500 mm	VDI/VDE/DGQ 2618 Part 4.1:2006 Option 3 und 4	2 µm + 2 · 10^{-6} · d	d = measured diameter
Ring gauges Diameter	2 mm	to	250 mm			
Optical flats and optical parallels	Ø 10 mm	to	Ø 200 mm			
Length	0.5 mm	to	100 mm	QM-APA 8.5.1.002.013 2020-07 comparison measurement	0.1 µm + 0.6 · 10^{-6} · l	l = measured length with gauge block comparator
deviation from parallelism		to	5 µm		0.05 µm	Parallelism measurement only up to Ø 80 mm
deviation from flatness		to	5 µm	QM-APA 8.5.1.002.010 2020-07 interferometric	0.03 µm	
Plane-parallel length standards not in accordance with DIN EN ISO 3650:1999	(7 x 7) mm²	to	(75 x 75) mm²			l = measured length with gauge block comparator
	Ø 8 mm	to	Ø 100 mm			
Length	0.5 mm	to	100 mm	QM-APA 8.5.1.002.013 2020-07 comparison measurement	0.1 µm + 0.5 · 10^{-6} · l	
deviation from parallelism					0.05 µm	Parallelism measurement only up to Ø 80 mm

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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
Length				
Gauge block comparator for calibration of gauge blocks	0.5 mm to 100 mm	DKD-R 4-1:2018	0.03 µm + 0.002 · D	$D \leq 10$ µm, for nominal length difference

Abbreviations used:

CMC	Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DGQ	Deutsche Gesellschaft für Qualität e.V.
DKD	Deutscher Kalibrierdienst
DKD-R	Guideline of Deutschen Kalibrierdienstes (DKD), published by the Physikalisch-Technischen Bundesanstalt
QM-APA	In-house method of the Kolb & Baumann GmbH & Co. KG
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.
VDI	Verein Deutscher Ingenieure e.V.