Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-12037-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: **06.08.2025**

Date of issue: 18.08.2025

This annex is part of the Accreditation Certificate D-K-12037-01-00.

Holder of the Accreditation Certificate:

Carl Zeiss Jena GmbH
Carl-Zeiss-Promenade 10, 07745 Jena

with the location

Carl Zeiss Jena GmbH
Kompetenzzentrum Qualität/Kalibrierlabor
Carl-Zeiss-Promenade 10, 07745 Jena

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and they conform to the principles of DIN EN ISO 9001.

Calibration in the fields:

Dimensional quantities

Length

- **Length gauges**
- **Line scales, distances**
- **Diameter**
- **Form error**
- **Length measuring devices** [a)]

Coordinate measuring technology

- **Coordinate measuring machines** [a)]

[a)] only 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.

DAkkS Deutsche Akkreditierungsstelle

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	VDI/VDE/DGQ 2618 part 3.1:2004 DKD-R 4-3 part 3.1:2018 featuring the nominal values of the standards 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	For the central length: 0.05 µm + 0.5 · 10^{-6} · l For the deviations f_o and f_u from the central length: 0.05 µm	l = gauge block length; Measuring surface quality as stated in QMH rsp. in the test specifications
Gauge blocks * made of ceramics according to DIN EN ISO 3650:1999	0.5 mm to 100 mm	VDI/VDE/DGQ 2618 part 3.1:2004 DKD-R 4-3 part 3.1:2018 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 central length: 0.07 µm + 0.5 · 10^{-6} · l For the deviations f_o and f_u from the central length: 0.05 µm	
Gauge blocks * made of steel according to DIN EN ISO 3650:1999	40 mm to 300 mm	VDI/VDE/DGQ 2618 part 3.1:2004 DKD-R 4-3 part 3.1:2018 For nominal lengths from 40 mm to 100 mm the difference to the nominal length of the standard has to be ≤ 25 mm. For nominal lengths ≥ 100 mm to 300 mm the difference to the nominal length of the standard has to be ≤ 50 mm. Measurement of the deviation l_c from the nominal l_n by comparison measurement.	For the central length: 0.12 µm + 1 · 10^{-6} · l	Measurement using ULM 600

DAkkS Deutsche Akkreditierungsstelle

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 according to DIN EN ISO 3650:1999	≥ 100 mm to 800 mm	VDI/VDE/DGQ 2618 part 3.1:2004 DKD-R 4-3 part 3.1:2018 For nominal lengths from 100 mm to 300 mm the difference to the nominal length of the standard has to be ≤ 50 mm. For nominal lengths ≥ 300 mm to 800 mm the difference to the nominal length of the standard has to be ≤ 100 mm. Measurement of the deviation l_c from the nominal l_n by comparison measurement.	For the central length: $0.1\ \mu m + 1 \cdot 10^{-6} \cdot l$	Measurement using ULM Rubin 800
Line scales made of glass, quartz glass, plastic or metal	0 mm to 600 mm	WI 0230 SJQ: 2017-03 Measurement in reflected or transmitted light	$0.03\ \mu m + 2 \cdot 10^{-7} \cdot l$	l = measured length Maximum thickness of the graduation carrier of 40 mm
Balls Diameter	2 mm to 100 mm	KA 12/38:2017-03	$0.2\ \mu m + 1.5 \cdot 10^{-6} \cdot d$	d = measured diameter
Roundness deviation			0.1 µm	

Valid from: 06.08.2025
Date of issue: 18.08.2025

DAkkS Deutsche Akkreditierungsstelle

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range			Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Setting ring gauges and inside cylinders Diameter *	2 mm	to	10 mm	VDI/VDE/DGQ 2618 part 4.1:2006 Option 3 and 4 DKD-R 4-3 part 4.1:2018 Option 5.3.3 and. 5.3.4	0.4 µm	d = measured diameter
	> 10 mm	to	300 mm		0.2 µm + 1.5 · 10^{-6} · d	
Setting plug gauges and outside cylinders Diameter *	1 mm	to	300 mm		0.2 µm + 1.5 · 10^{-6} · d	
Measuring pins and thread testing pins Diameter *	0.17 mm	to	20 mm	VDI/VDE/DGQ 2618 part 4.2:2007 option 3 DKD-R 4-3 part 4.2:2018 Option 5.3.3	0.2 µm + 1.5 · 10^{-6} · d	
Roundness deviation * of abovementioned rings, inside cylinders, plugs or outside cylinders, test pins and thread test pins		to	40 µm	VDI/VDE/DGQ 2618 part 4.1:2006 and part 4.2:2007 Option 1 and 2 DKD-R 4-3 part 4.1 and 4.2:2018 Option 5.3.1 and 5.3.2 Form testing of test pins and thread test pins from Ø 1 mm	0.05 µm	
Straightness deviation of surface lines * of abovementioned rings, inside cylinders, plugs or outside cylinders, test pins and thread test pins		to	40 µm	axial length: ≤ 100 mm axial length: > 100 mm	0.15 µm 0.15 µm + 2 · 10^{-7} · l	l = measured length in direction of cylinder axis
Parallelism deviation of surface lines * of abovementioned rings, inside cylinders, plugs or outside cylinders,		to	40 µm	axial length: ≤ 100 mm axial length: > 100 mm	0.2 µm 0.2 µm + 5 · 10^{-7} · l	l = measured length in direction of cylinder axis

DAkkS Deutsche Akkreditierungsstelle

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Optical flats and optical parallels Central length	0.5 mm to 100 mm	KA 12/01: 2025-01 maximal diameter 60 mm	0.15 µm + 1 · 10^{-6} · l	l = measured length in direction of cylinder axis
Optical flats and optical parallels Flatness standards		KA 12/01:2025-01 digital interferometer		L = length of the measured plane
Flatness deviation	for diameter:			Maximum height of the measured plane: 90 mm
	> 0 mm to 60 mm		0.020 µm	
	> 60 mm to 150 mm		0.025 µm	
	> 150 mm to 300 mm		0.050 µm	
	for length:			[1] for 12“ Interferometer [2] for 6“ Interferometer
	> 300 mm to 1000 mm		1.5 · 10^{-7} · L [1] 1.94 · 10^{-7} · L [2]	
Parallelism deviation	for diameter:			d = mean thickness of the calibration object
	> 0 mm to 150 mm		0.029 µm + 2,3 · 10^{-6} · d	
	> 150 mm to 300 mm		0.045 µm + 2,3 · 10^{-6} · d	
Length standards for optical measurements Distances of unidirectional structures on flat substrates and structure carriers		KA 12/40: 2025-01 Substitution measuring with an optical line scale using a coordinate measuring machine with opto-electronic probing		l = measured length $U\alpha$ = uncertainty of the linear thermal expansion coefficient of the calibration items material
	> 0 mm bis 500 mm	$U\alpha \leq 0.1 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.02 · 10^{-6} · l	
	> 0 mm bis 500 mm	$U\alpha \leq 0.5 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.03 · 10^{-6} · l	
	> 0 mm bis 500 mm	$U\alpha \leq 2 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.09 · 10^{-6} · l	
	> 0 mm bis 600 mm	$U\alpha \leq 0.1 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.19 · 10^{-6} · l	
	> 0 mm bis 600 mm	$U\alpha \leq 0.5 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.19 · 10^{-6} · l	
	> 0 mm bis 600 mm	$U\alpha \leq 2 \cdot 10^{-6} \cdot K^{-1}$	0.06 µm + 0.21 · 10^{-6} · l	
optical 2D-structures on flat substrates and structure carriers Positions and distances	Measuring area 400 mm x 400 mm	KA 12/39:2017-02 Measurement in reflected or transmitted light	1D: 0.4 µm + 2 · 10^{-6} · l 2D: 0.5 µm + 2 · 10^{-6} · l	For example center coordinates and positions of circles, ellipses, lines, reticles, polygons and unidirectional edges on optical calibration standards and calibration boards Minimum structure size 5 µm, structure height << 1 mm l = measured length

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
optical 2D-structures on flat substrates and structure carriers Positions and distances	Measuring area 700 mm x 1000 mm	KA 12/39:2017-02 Measurement in reflected light	1D: $1\ \mu m + 2 \cdot 10^{-6} \cdot l$ 2D: $2\ \mu m + 1 \cdot 10^{-6} \cdot l$	For example center coordinates and positions of circles, ellipses, lines, reticles, polygons and unidirectional edges on optical calibration standards and calibration boards Minimum structure size 10 µm, structure height << 1 mm l = measured length
optical edges on flat substrates and structure carriers Straigthness deviation	Measuring area 400 mm x 400 mm	KA 12/39:2017-02 Measurement in reflected or transmitted light	$\sqrt{(0.9\mu m)^2 + (2.4 \cdot 10^{-6} \cdot l)^2}$	Structure height << 1 mm l = length of the edge
	Measuring area 700 mm x 1000 mm	KA 12/39:2017-02 Measurement in reflected light	$\sqrt{(2.6\mu m)^2 + (2.5 \cdot 10^{-6} \cdot l)^2}$	
optical circles on flat substrates and structure carriers Roundness deviation	for diameter: 0.01 mm to 400 mm	KA 12/39:2017-02 Measurement in reflected or transmitted light	$\sqrt{(0.9\mu m)^2 + (6 \cdot 10^{-6} \cdot d)^2}$	Recording of at least 32 equal distributed edge points Structure height << 1 mm d = diameter of a circle
	> 400 mm to 700 mm	KA 12/39:2017-02 Measurement in reflected light	$\sqrt{(2.6\mu m)^2 + (6 \cdot 10^{-6} \cdot d)^2}$	
optical 2D-structures on flat substrates and structure carriers angle deviation	0° to 360°	KA 12/39:2017-02 Measurement in reflected or transmitted light	0.6´´ + (0.19 m / l)´´	Maximal leg length 400 mm Structure height << 1 mm l = length of the legs (symmetrical); in case of different leg lengths U will be calculated individually
	0° to 360°	KA 12/39:2017-02 Measurement in reflected light	0.6´´ + (0.72 m / l)´´	Maximal leg length 1000 mm Structure height << 1 mm l = length of the legs (symmetrical); in case of different leg lengths U will be calculated individually

On-site calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length				
Length measuring devices * Horizontal type with max. 3000 mm	0 mm to 3000 mm	VDI/VDE/DGQ 2618 part 17.1:2015	$0.08\ \mu m + 1 \cdot 10^{-6} \cdot l$	l = length measured by the measuring element
Coordinate measuring technology				
Measuring microscopes, measuring projectors 2D optical coordinate measuring machines *	0 mm to 909 mm	DKD-R 4-3 part 18.1:2018 Calibration of metrological characteristics of coordinate measuring machines according to DIN EN ISO 10360 and VDI/VDE 2617		Measuring devices with visual probing or opto-electronic edge detection
		Probing size error P_S and probing size error of the imaging probing system P_{SV} using a line width / CD standard according to VDI/VDE 2617 part 6.1:2021	0.075 µm	
		Probing form error P_{F2D} and probing form error of the imaging probing system P_{FV2D} using a test circle according to DIN EN ISO 10360-7:2011 and VDI/VDE 2617 part 6.1:2021	0.15 µm (including the calibrated form error of the test circle) 0.042 µm (excluding the calibrated form error of the test circle)	
		Probing size error P_{S2D} and P_{SV2D} using a test circle according to VDI/VDE 2617 part 6.1:2021	0.14 µm	
		Unidirectional length measurement error E_{UX}, E_{UY}, E_{UXY} and unidirectional length measurement error of the imaging probing system E_{UV} using linear glass scales according to DIN EN ISO 10360-7:2011 and VDI/VDE 2617 part 6.1:2021	$0.04\ \mu m + 0.36 \cdot 10^{-6} \cdot l$	

On-site calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Coordinate measuring technology Measuring microscopes, measuring projectors 2D optical coordinate measuring machines *	0 mm to 909 mm	Bidirectional length measurement error E_{BX}, E_{BY}, E_{BXY} and bidirectional length measurement error of the imaging probing system E_{BV} using line scales according to DIN EN ISO 10360-7:2011 and VDI/VDE 2617 part 6.1:2021	0.08 µm + 0.36 · 10^{-6} · l	l = measured length in m
		Repeatability range of the length measurement error R_U, R_B according to DIN EN ISO 10360-7:2011 and VDI/VDE 2617 part 6.1:2021 and R_{UXY} according to VDI/VDE 2617 part 6.1:2021	0.05 µm	Measuring devices with visual probing or opto-electronic edge detection l = measured length in m
		Squareness error of the measurement axis using a right angle standard (COG-line plate)	0.25´´	

Abbreviations used:

CMC	Calibration and measurement capabilities
DGQ	Deutsche Gesellschaft für Qualität e.V.
DIN	Deutsches Institut für Normung e.V.
DKD-R	Guideline of Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt
EN	Europäische Norm – European Standard
EURAMET	European Association of National Metrology Institutes
IEC	International Electrotechnical Commission
ISO	International Organization for Standardisation
KA	Calibration guide of Carl Zeiss Jena GmbH
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.
VDI	Verein Deutscher Ingenieure e.V.
WI	Work Instruction of Carl Zeiss Jena GmbH