DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the calibration laboratory

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

is competent under the terms of DIN EN ISO/IEC 17025:2018 to carry out calibrations in the following 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

The accreditation certificate shall only apply in connection with the notice of accreditation of 15.12.2020 with the accreditation number D-K-12037-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 8 pages.

Registration number of the certificate: **D-K-12037-01-00**

Berlin, 15.12.2020	Dr Heike Manke Head of Division	Translation issued: 11.01.2021	Head of Division

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

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

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Spittelmarkt 10
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Office Frankfurt am Main
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Office Braunschweig
Bundesallee 100
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The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

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Annex to the Accreditation Certificate D-K-12037-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **15.12.2020**

Date of issue 15.12.2020

Holder of certificate:

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

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.

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

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

Abbreviations used: see last page

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1]	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 oft he 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

[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.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1]	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 oft he 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
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		$0.2\ \mu m + 1.5 \cdot 10^{-6} \cdot d$	
Setting plug gauges and outside cylinders Diameter *	1 mm to 300 mm		$0.2\ \mu m + 1.5 \cdot 10^{-6} \cdot d$	
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	$0.2\ \mu m + 1.5 \cdot 10^{-6} \cdot d$	

[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.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
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
Balls Diameter	2 mm to 100 mm	KA 12/38:2017-03	0.2 µm + 1.5 · 10^{-6} · d	d = measured diameter
Roundness deviation			0.1 µm	
Optical flats and optical parallels Central length	0.5 mm to 100 mm	KA 12/01:2017-02 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 deviation	for diameter 0 mm to 150 mm	KA 12/01:2017-02 digital interferometer	0.03 µm	
Parallelism deviation			0.05 µm	

[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.

Date of issue: 15.12.2020
Valid from: 15.12.2020

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1]	Remarks
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: $0.4\ \mu m + 2 \cdot 10^{-6} \cdot l$ 2D: $0.5\ \mu m + 2 \cdot 10^{-6} \cdot l$	For example center coordinates and positions of circles, ellipses, lines, reticles, polygons and unidirectional edges on optical calibration standards and calibration boards Minimum struture size 5 µm, structure height << 1 mm l = measured length
	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	$\sqrt{(2{,}6\mu m)^2 + (6 \cdot 10^{-6} \cdot d)^2}$	

[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.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1]	Remarks
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 [1]	Remarks
Length				
Length measuring devices * Horizontal type with max. 3000 mm measuring range of the measuring element	Measuring element 0 mm to 3000 mm	VDI/VDE/DGQ 2618 part 17.1:2015	0.08 µm + 1 · 10^{-6} · *l*	*l* = length measured by the measuring element

[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.

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
Coordinate measuring technology				
Measuring microscopes, measuring projectors, optical 2D optical coordinate measuring machines *	0 mm to 909 mm	DKD-R 4-3 part 18.1:2018 Calibration of metrological characteristics with a calibrated coordinate measuring machine according to DIN EN ISO 10360 and VDI/VDE 2617		Measuring devices with visual probing or opto-electronic edge detection
		Determination of probing error *PS-1D(OT)* on a line width / CD standard according to VDI/VDE 2617 part 6.1:2007	0.08 µm	
		Determination of probing error P_{F2D} on a circle standard according to DIN EN ISO 10360-7:2011	0.30 µm	
		The error of indication for size measurement E_{BX}, E_{BY} in direction X and Y along the axis on line scales with chrome on glass structures according to DIN EN ISO 10360-7:2011	0.1 µm + 0.3 · 10^{-6} · l	l = measured length
		The error of indication for size measurement E_{UX}, E_{UY} in direction X and Y along the axis on line scales with chrome on glass structures according to DIN EN ISO 10360-7:2011	0.05 µm + 0.3 · 10^{-6} · l	
		The error of indication for size measurement E_{BXY} with on line scales with chrome on glass structures according to DIN EN ISO 10360-7:2011	0.1 µm + 0.3 · 10^{-6} · l	

[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.

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1]	Remarks
Measuring microscopes, measuring projectors, 2D optical coordinate measuring machines *	0 mm to 909 mm	The indication error for size measurement E_{UXY} on line scales with chrome on glass structures according to DIN EN ISO 10360-7:2011	0.05 µm + 0.3 · 10^{-6} · l	Measuring devices with visual probing or opto-electronic edge detection l = measured length
		The indication error for perpendicularity deviation between the measurement axis of a right angle standard (COG-line plate)	0.3´´	

Abbreviations used:

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

[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.

Date of issue: 15.12.2020
Valid from: 15.12.2020