

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Accreditation Certificate** that the calibration laboratory

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment activities specified in more detail in the partial accreditation certificates listed below. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

D-K-15007-01-01

D-K-15007-01-02

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

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This accreditation certificate consists of this cover sheet, the reverse side of the cover sheet and the following annex. It only applies in connection with the partial accreditation certificates listed above and the notices referred to there.

Registration number of the certificate: **D-K-15007-01-00**

Berlin, 09.11.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
14.12.2022



Dipl.-Ing. Gabriel Zrenner
Head of Department

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 (www.dakks.de).

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

See notes overleaf

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The Deutsche Akkreditierungsstelle GmbH (DAkKS) is the entrusted national accreditation body of the Federal Republic of Germany according to § 8 section 1 AkkStelleG in conjunction with § 1 section 1 AkkStelleGBV. DAkKS is designated as the national accreditation authority by Germany according to Art. 4 Para. 4 of Regulation (EC) 765/2008 and clause 4.7 of DIN EN ISO/IEC 17000.

Pursuant to Art. 11 section 2 of Regulation (EC) 765/2008, the accreditation certificate shall be recognised as equivalent by the national authorities within the scope of this Regulation as well as by the WTO member states that have committed themselves in bilateral or multilateral mutual agreements to recognise the certificates of accreditation bodies that are members of ILAC or IAF as equivalent.

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 Co-operation (ILAC).

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

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15007-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 09.11.2022

Date of issue: 09.11.2022

Holder of accreditation certificate:

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, where applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities specified in the partial accreditation certificates listed below:

D-K-15007-01-01

D-K-15007-01-02

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

This certificate annex is only valid together with the written accreditation certificate and 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>.

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Partial Accreditation Certificate** that the calibration laboratory

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment listed in the annex to this certificate. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

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

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

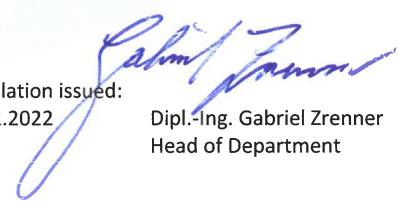
This partial accreditation certificate only applies in connection with the notice of 09.11.2022 with accreditation number D-K-15007-01.
It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 12 pages.

Registration number of the partial accreditation certificate: **D-K-15007-01-01**
It is a part of the accreditation certificate: D-K-15007-01-00.

Berlin, 09.11.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
14.12.2022



Dipl.-Ing. Gabriel Zrenner
Head of Department

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 (www.dakks.de).

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Deutsche Akkreditierungsstelle

Annex to the Partial Accreditation Certificate D-K-15007-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: 09.11.2022

Date of issue: 09.11.2022

This annex is a part of the accreditation certificate D-K-15007-01-00.

Holder of partial accreditation certificate:

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, if applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities listed below.

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

Calibrations at the locations:

Carl-Zeiss-Straße 22, 73447 Oberkochen
Willy-Messerschmitt-Straße 1, 73457 Essingen

This certificate annex is only valid together with the written accreditation certificate and 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>.

Annex to the Partial Accreditation Certificate D-K-15007-01-01

Calibrations in the fields:

Dimensional quantities

Length

- Gauge blocks
- Diameter
- Form error
- Linear thermal expansion coefficient

Coordinate measuring technology

- Step gauges
- Virtual coordinate measuring machines
- Application coordinate measuring machines

Valid from: 09.11.2022

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

Annex to the Partial Accreditation Certificate D-K-15007-01-01

Permanent Laboratory - Oberkochen

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	10 mm to 2000 mm nominal size	I_DI_S_ALM_01_01_A_12: 2019/10 Measurement of the mean size with flat mirror laser interferometer with mechanical probing of the measurement surface. The wringing of both measurement surfaces must be checked using a suitable flat mirror plate.	for the mean size: $0.05 \mu\text{m} + 0.3 \cdot 10^{-6} \cdot l$	l = gauge block length Measuring surface quality as stated in QMH resp. in the work specifications.
			for the mean size: $0.05 \mu\text{m} + 0.25 \cdot 10^{-6} \cdot l$	The uncertainty of measurement of the linear coefficient of thermal expansion of object to be calibrated $U(\alpha) \leq 0.1 \cdot 10^{-6} \text{K}^{-1}$
			for the mean size: $0.05 \mu\text{m} + 0.4 \cdot 10^{-6} \cdot l$	
Gauge blocks made of ceramics according to DIN EN ISO 3650:1999	10 mm to 500 mm nominal size			
Gauge blocks made of steel according to DIN EN ISO 3650:1999	50 mm to 500 mm nominal size	I_DI_S_ALM_01_01_A_13: 2019/10 Measurement of the mean size with a coordinate measuring machine in comparison with a gauge block made of steel of the same nominal size and determining the parallelism of the measurement	$0.08 \mu\text{m} + 0.4 \cdot 10^{-6} \cdot l$	l = gauge block length
Length of workpieces with plane parallel surfaces with optical measurement surface quality	10 mm to 2000 mm nominal size	I_DI_S_ALM_01_01_A_12: 2019/10 Measurement of the length with flat mirror laser interferometer with mechanical probing of the measurement surface. Measurement surface quality (planarity and parallelism), the linear coefficient of thermal expansion α and its uncertainty are considered in the measurement uncertainty.		l = measured length
			$0.05 \mu\text{m} + 0.15 \cdot 10^{-6} \cdot l$	material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} \text{K}^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} \text{K}^{-1}$
			$0.05 \mu\text{m} + 0.25 \cdot 10^{-6} \cdot l$	material: steel with an uncertainty of the coefficient of linear thermal expansion $U(\alpha) \leq 0.1 \cdot 10^{-6} \text{K}^{-1}$
			$0.05 \mu\text{m} + 0.3 \cdot 10^{-6} \cdot l$	material: steel
			$0.05 \mu\text{m} + 0.4 \cdot 10^{-6} \cdot l$	material: ceramics

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Annex to the Partial Accreditation Certificate D-K-15007-01-01

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Thermal expansion coefficient <i>CTE</i> of workpieces and standards	Maximum dimension for the calibration object Length: 2500 mm Width: 180 mm Height: 80 mm Maximum measurable length at the calibration object: 1450 mm	I_DI_S_ALM_01_01_A_25: 2022/07 Measurement of length and temperature changes and mathematical derivation of the thermal expansion coefficient <i>CTE</i>	$U_{CTE}(t) = 0.02 \cdot 10^{-6} K^{-1} + 1.5 \cdot 10^{-3} \cdot CTE + (0.027 \cdot 10^{-6} K^{-1} m) / L$ for $10^\circ C \leq t \leq 30^\circ C$	L = measured length CTE = thermal expansion coefficient The CTE is given as a model in the form of a linear component α and a quadratic component β . Example: $U_{CTE}(t) = 0.07 \cdot 10^{-6} K^{-1}$ for steel: $L = 1$ m $U_{CTE}(t) = 0.09 \cdot 10^{-6} K^{-1}$ for steel: $L = 0.5$ m
Step gauge blocks	to 2080 mm	I_DI_S_ALM_01_01_A_06: 2019/05 Measurement of the mean size with flat mirror laser interferometer with mechanical probing of the measurement surface. The perpendicularity deviation of the measuring surfaces must not exceed 1.5'.	unidirectional probing: $0.03 \mu m + 0.09 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.04 \mu m + 0.09 \cdot 10^{-6} \cdot l$	l = step length; material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} K^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} K^{-1}$
			unidirectional probing: $0.03 \mu m + 0.14 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.04 \mu m + 0.14 \cdot 10^{-6} \cdot l$	l = step length; material: steel with an uncertainty of the coefficient of linear thermal expansion $U(\alpha) \leq 0.1 \cdot 10^{-6} K^{-1}$
			unidirectional probing: $0.03 \mu m + 0.18 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.04 \mu m + 0.18 \cdot 10^{-6} \cdot l$	material: steel

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Step gauge blocks	to 2500 mm	I_DI_S_ALM_01_01_A_06: 2019/05 Measurement of the mean size with flat mirror laser interferometer with mechanical probing of the measurement surface. The perpendicularity deviation of the measuring surfaces must not exceed 1.5'.	unidirectional probing: $0.06 \mu\text{m} + 0.09 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.08 \mu\text{m} + 0.09 \cdot 10^{-6} \cdot l$	material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$
	to 2500 mm	I_DI_S_ALM_01_01_A_06: 2019/05 Measurement of the mean size with flat mirror laser interferometer with mechanical probing of the measurement surface. The perpendicularity deviation of the measuring surfaces must not exceed 1.5'.	unidirectional probing: $0.06 \mu\text{m} + 0.14 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.08 \mu\text{m} + 0.14 \cdot 10^{-6} \cdot l$	l = step length; material: steel with an uncertainty of the coefficient of linear thermal expansion $U(\alpha) \leq 0.1 \cdot 10^{-6} \text{ K}^{-1}$
			unidirectional probing: $0.06 \mu\text{m} + 0.18 \cdot 10^{-6} \cdot l$ bidirectional probing: $0.08 \mu\text{m} + 0.18 \cdot 10^{-6} \cdot l$	material: steel
Setting ring and plug gauges; inside and outside cylinder Diameter	3 mm to 400 mm	VDI/VDE/DGQ 2618 part 4.1:2006 Measurement of the 2-point diameter with flat mirror laser interferometer with mechanical probing of the measurement surface.	$0.08 \mu\text{m} + 0.15 \cdot 10^{-6} \cdot d$	d = diameter material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$
Setting ring and plug gauges; inside and outside cylinder Diameter	3 mm to 400 mm	VDI/VDE/DGQ 2618 part 4.1:2006 Measurement of the 2-point diameter with flat mirror laser interferometer with mechanical probing of the measurement surface.	$0.08 \mu\text{m} + 0.25 \cdot 10^{-6} \cdot d$	d = diameter material: steel with an uncertainty of the coefficient of linear thermal expansion $U(\alpha) \leq 0.1 \cdot 10^{-6} \text{ K}^{-1}$
			$0.08 \mu\text{m} + 0.3 \cdot 10^{-6} \cdot d$	material: steel
		I_DI_S_ALM_01_01_A_08: 2017/06 Measurement with coordinate measuring machines	$0.08 \mu\text{m} + 0.4 \cdot 10^{-6} \cdot d$	material: ceramics
			$0.7 \mu\text{m} + 2 \cdot 10^{-6} \cdot d$	

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Annex to the Partial Accreditation Certificate D-K-15007-01-01

Permanent Laboratory - Oberkochen

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Roundness deviation	3 mm to 400 mm	Talyrond 61 with Multiple layer procedure	$0.015 \mu\text{m} + 7 \cdot 10^{-2} \cdot RONt$	$RONt$ = roundness deviation
		Single-layer procedure	$0.1 \mu\text{m}$	
Straightness deviation of surface lines	0 mm to 100 mm axial length	I_DI_S_ALM_01_01_A_08: 2017/06	$0.4 \mu\text{m} + 0.1 \cdot STRt$	$STRt$ = straightness deviation
Parallelism deviation of surface lines			$0.4 \mu\text{m} + 0.1 \cdot STRt$	
Straightness deviation of surface lines	> 100 mm to 500 mm axial length		$0.8 \mu\text{m} + 0.1 \cdot STRt$	
Parallelism deviation of surface lines			$1.0 \mu\text{m} + 0.1 \cdot STRt$	
Setting ring and plug gauges; inside and outside cylinder Diameter	16 mm, 30 mm, 50 mm nominal size	VDI/VDE/DGQ 2618 part 4.1:2006 Measurement of the 2-point diameter with a coordinate measuring machine in comparison with a ring or plug of the same nominal size	$0.11 \mu\text{m} + 0.25 \cdot 10^{-6} \cdot d$	d = diameter
Magnification standards (cylinder with flat area; flick-standard)	flat area to 300 μm Diameter to 50 mm	I_DI_S_ALM_01_01_A_09: 2017/06 Measurement with roundness measuring machines	$0.12 \mu\text{m} + 0.02 \cdot RONt$	$RONt$ = roundness deviation
Balls Diameter	2 mm to 200 mm	I_DI_S_ALM_01_01_A_07: 2021 Measurement of the 2-point diameter with flat mirror laser interferometer with mechanical probing of the measurement surface	$0.08 \mu\text{m} + 0.15 \cdot 10^{-6} \cdot d$	d = diameter material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$
				d = diameter material: steel with an uncertainty of the coefficient of linear thermal expansion $U(\alpha) \leq 0.1 \cdot 10^{-6} \text{ K}^{-1}$
				material: steel
				material: ceramics
		I_DI_S_ALM_01_01_A_08: 2017/06 Measurement with coordinate measuring machines	$0.7 \mu\text{m} + 2 \cdot 10^{-6} \cdot d$	d = diameter

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Permanent Laboratory - Oberkochen

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Roundness deviation		Talyrond 61 with Multiple layer procedure	$0.015 \mu\text{m} + 7 \cdot 10^{-2} \cdot RON_t$	RON_t = roundness deviation
		Single-layer procedure	0.1 μm	
Balls Diameter	25 mm and 30 mm nominal size	I_DI_S_ALM_01_01_A_10: 2017/06 Measurement of the 2-point diameter with a coordinate measuring machine in comparison to a ball of the same nominal size	$0.09 \mu\text{m} + 0.35 \cdot 10^{-6} \cdot d$	d = diameter
Coordinate measuring technology Ball and hole bar	to 2000 mm Axially distance between ball and hole center points	I_DI_S_ALM_01_01_A_14_I1: 2017/06 Measurement with flat mirror laser interferometer with mechanical probing of the measurement surface		l = distance between ball and hole center points
			$0.08 \mu\text{m} + 0.3 \cdot 10^{-6} \cdot l$	material: steel
			$0.08 \mu\text{m} + 0.15 \cdot 10^{-6} \cdot l$	material: glass ceramics or ceramics with a coefficient of linear thermal expansion $ \alpha \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$ and its uncertainty $U(\alpha) \leq 0.05 \cdot 10^{-6} \text{ K}^{-1}$

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Annex to the Partial Accreditation Certificate D-K-15007-01-01

Permanent Laboratory - Essingen

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Coordinate measuring technology Prismatic workpieces	Coordinate measuring machine with one for the implementation of the calibration procedure specified measuring volume with the dimensions $X = 1160 \text{ mm}$ $Y = 2060 \text{ mm}$ $Z = 620 \text{ mm}$ (the indications X, Y, Z designate the coordinate axes in manufacturer notation) Calibrations are performed with probing elements with a diameter in range 0,3 mm to 30 mm.	Tactile measurements using a calibrated coordinate measuring machine and determination of geometric parameters defined through control geometries (single-points, straight lines, planes, circles, balls, cylinders, tapers, toroids) using the evaluation software of the coordinate measuring machine. The measuring points can be detected by single point or scanning method. Single-point measuring can be carried out either with fixed, predefined measuring force or with extrapolation on measuring force zero. Single point measurements in the form of „Self-centering measurements“ are not used within the framework of the accreditation. Excluded are evaluations of gearing parameters and free form surfaces and the use of a turntable in the measuring process. The calibration values can be determined in a substitution and multilayer method by averaging in order to reduce the measurement uncertainty.	The uncertainty of measurement is determined according to ISO/TS 15530-4: 2008 "Evaluating task specific measurement uncertainty using simulation" using the "Virtual Coordinate Measuring Machine" method. The measurement uncertainty for bidirectional length-measurements on steel artefacts in measuring positions according to DIN EN ISO 10360-2: 2010 and in the specified measurement volume is for a central stylus (zero distance between center of the probing ball and the pinole axis) maximum: $U_{E0} = 0.3 \mu\text{m} + 2 \cdot 10^{-6} \cdot L$ and for measurements with lateral stylus (150 mm distance between center of the probing ball and the pinole axis) maximum: $U_{E150} = 0.4 \mu\text{m} + 2 \cdot 10^{-6} \cdot L$ The smallest applicable measurement uncertainty for bidirectional length measurements on test pieces made of steel and of length L is in the specified measuring volume: $L = 20 \text{ mm } U = 0.3 \mu\text{m}$ $L = 1000 \text{ mm } U = 1.9 \mu\text{m}$ $L = 1980 \text{ mm } U = 7.4 \mu\text{m}$	$L =$ measured length The measurement uncertainty is task-specific. Therefore, no smallest applicable measurement uncertainty can be specified for any measuring tasks. The here specified measurement uncertainties are exemplary for the respectively described measuring tasks. For general measuring tasks referred to the accredited scope the measuring uncertainty could be significant differently. The specified uncertainty in the calibration certificate only refers to the used measurement and evaluation strategy. This includes measuring point distribution, filtering of the measured values and outlier elimination. The measurement and evaluation strategy is explicitly documented in the calibration certificate. The dimension of a task-specific measurement uncertainty can be estimated based on the information of a inspection plan. The laboratory can do this before the real measurement starts.

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Prismatic workpieces	Coordinate measuring machines with a calibrated measuring volume of: X = 1160 mm Y = 2060 mm Z = 620 mm		The measurement uncertainty for diameter and form measurements on a ball made of ceramic with nominal diameter 25 mm, measured in scanning mode and with a measuring strategy according to DIN EN ISO 10360-5: 2018 E, is in the specified measuring volume: for the determination of the form deviation (evaluation to Tschebyschew) $U = 0.23 \mu\text{m}$ for the determination of the diameter (evaluation to Gauß) $U = 0.34 \mu\text{m}$	The stated measurement uncertainties for the scanning mode have been determined in consideration of an wave filter according to DIN EN ISO 16610-21: 2013 with a cut-off wavelength of 150 W/U.
Step gauge blocks	to 1100 mm	I_DI_S_ALM_01_01_A_24: 2019/11 Measurement of the mean size with a coordinate measuring machine in comparison with a step gauge block of the same nominal size	$0.06 \mu\text{m} + 0.22 \cdot 10^{-6} \cdot l$	$l = \text{step length}$
Length standards for optical metrology Distances of edges aligned in the same direction (unidirectional) and center-to-center distances of structures on flat substrates (photomasks with CR layer)	to 350 mm	I_DI_S_ALM_01_01_A_26: 2022/08 Substitution measurement with a line scale of equal nominal length using a coordinate measuring machine and optical scanning in transmitted light.	$0.09 \mu\text{m} + 0.15 \cdot 10^{-6} \cdot l$	$l = \text{measured length of } \alpha \leq 0.5 \cdot 10^{-6} \text{ K}^{-1} \text{ and } U\alpha \leq 0.1 \cdot 10^{-6} \text{ K}^{-1}$ The linear thermal expansion coefficient α and its uncertainty are taken into account in the measurement uncertainty.
	> 290 mm to 500 mm	With a line scale of equal nominal lengths in connection method	$0.13 \mu\text{m} + 0.21 \cdot 10^{-6} \cdot l$	
	to 350 mm	Measurand of arbitrary nominal lengths	$0.15 \mu\text{m} + 0.10 \cdot 10^{-6} \cdot l$	

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
	> 290 mm to 500 mm	Measurand of arbitrary nominal length using line scales in connection method	$0.21 \mu\text{m} + 0.16 \cdot 10^{-6} \cdot l$	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length standards for optical metrology Diameter of structures on flat substrates (photo-masks with CR layer)	0.06 mm to 10 mm	I_DI_S_ALM_01_01_A_26: 2018/04 Substitution measurement with a circular normal and the same nominal diameters using a coordinate measuring machine and optical scanning in transmitted light. Twenty-five single-points are probed according to the dot pattern of the DIN EN ISO 10360-7: 2011. For layer thickness between 30 nm and 190 nm. The calibration object is identical to the traceability standard.	0.25 μm	Diameter and form error refer to the probing points
Roundness deviation ($RONt$)			0.3 μm	
Length standards for optical measurement technology Roundness deviation ($RONt$) of structures on flat substrates (photo-masks with CR layer)	0.06 mm to 10 mm	I_DI_S_ALM_01_01_A_26: 2018-04 Measurement with a coordinate measuring machine and optical probing in transmitted light. Twenty-five single-points are probed according to the dot pattern of the DIN EN ISO 10360-7: 2011. For layer thickness between 30 nm and 190 nm.	0.6 μm	Form error refers to the probing points
Length standards for optical metrology	2D-Range: 900 mm x 1100 mm	I_DI_S_ALM_01_01_A_22: 2018/12 Measurement of center distances and X-, Y-coordinates with a calibrated coordinate measuring machine and optical probing. The measurement is performed on symmetrical 2D structures (center of a circle, middle of the line, center of a reticle).	$0.7 \mu\text{m} + 2 \cdot 10^{-6} \cdot l$	l = measured length
	2D- Range: 1200 mm x 1980 mm		$1.4 \mu\text{m} + 2.2 \cdot 10^{-6} \cdot l$	

Valid from: 09.11.2022

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Annex to the Partial Accreditation Certificate D-K-15007-01-01
Permanent Laboratory - Essingen
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Two-point diameter and distances	up to 1100 mm	I_DI_S_ALM_01_01_A_28: 2018/11 Substitution measurement with a calibrated standard (ball, ring or step gauge) with a coordinate measuring machine and tactile single-point probing.	Calculation of the measurement uncertainty using the method „Virtual coordinate measuring machine“ based on ISO/TS 15530-4: 2008 taking into account the substitution effect $0.1 \mu\text{m} + 0.4 \cdot 10^{-6} \cdot l$	l = measured length
	up to 2060 mm		$0.25 \mu\text{m} + 0.3 \cdot 10^{-6} \cdot l$	
Balls	to 30 mm	I_DI_S_ALM_01_01_A_27: 2018/11 Substitution measurement with a ball by means of a coordinate measuring machine and tactile single-point probing. Twenty-five single-points are probed according to the dot pattern of the DIN EN ISO 10360-5:2011	Calculation of the measurement uncertainty using the method „Virtual coordinate measuring machine“ based on ISO/TS 15530-4: 2008 taking into account the substitution effect $0.1 \mu\text{m}$	d = Diameter (measurement of the hemisphere) The best measurement uncertainty is only achieved with the same nominal dimension. Diameter and form error refer to the probing points.
Diameter			$0.1 \mu\text{m}$	
Form error			$0.07 \mu\text{m}$	

Abbreviations used:

CMC	Calibration and measurement capabilities
DGQ	Deutsche Gesellschaft für Qualität e.V.
DIN	Deutsches Institut für Normung e.V. – German institute for standardization
I_DI_S	Calibration instruction of the Carl Zeiss Industrielle Messtechnik GmbH
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.
VDI	Verein Deutscher Ingenieure e.V.

Valid from: 09.11.2022

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

Accreditation



The Deutsche Akkreditierungsstelle attests with this **Partial Accreditation Certificate** that the calibration laboratory

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment listed in the annex to this certificate. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

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

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This partial accreditation certificate only applies in connection with the notice of 09.11.2022 with accreditation number D-K-15007-01.
It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 2 pages.

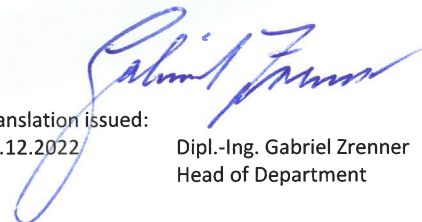
Registration number of the partial accreditation certificate: **D-K-15007-01-02**
It is a part of the accreditation certificate: D-K-15007-01-00.

Berlin, 09.11.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department

Translation issued:
14.12.2022

Dipl.-Ing. Gabriel Zrenner
Head of Department



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 (www.dakks.de).

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

See notes overleaf

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The Deutsche Akkreditierungsstelle GmbH (DAkKS) is the entrusted national accreditation body of the Federal Republic of Germany according to § 8 section 1 AkkStelleG in conjunction with § 1 section 1 AkkStelleGBV. DAkKS is designated as the national accreditation authority by Germany according to Art. 4 Para. 4 of Regulation (EC) 765/2008 and clause 4.7 of DIN EN ISO/IEC 17000.

Pursuant to Art. 11 section 2 of Regulation (EC) 765/2008, the accreditation certificate shall be recognised as equivalent by the national authorities within the scope of this Regulation as well as by the WTO member states that have committed themselves in bilateral or multilateral mutual agreements to recognise the certificates of accreditation bodies that are members of ILAC or IAF as equivalent.

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 Co-operation (ILAC).

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

Deutsche Akkreditierungsstelle

Annex to the Partial Accreditation Certificate D-K-15007-01-02 according to DIN EN ISO/IEC 17025:2018

Valid from: 09.11.2022

Date of issue: 09.11.2022

This annex is a part of the accreditation certificate D-15007-01-00.

Holder of partial accreditation certificate:

Carl Zeiss Industrielle Messtechnik GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, if applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities listed below.

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

Thermodynamic quantities

Temperature quantities

- **Resistance thermometers**
- **Thermocouples**
- **Direct reading thermometers**

This certificate annex is only valid together with the written accreditation certificate and 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>.

Abbreviations used: see last page

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

Annex to the Partial Accreditation Certificate D-K-15007-01-02

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Temperature quantities Resistance thermometers, Direct reading thermometers with resistance sensor SPRT Pt-100	0 °C to 29,7646 °C	I_DI_S_ALM_01_01_A_31: 2021/03 Fixed Points: TPW, Ga	3 mK 6 mK	Calibration at temperature fixed points, characteristic curve approximation according to ITS-90. The measurement uncertainty refers to the characteristic curve approximation in the specified range.
Resistance thermometers, direct reading thermometers with resistance sensor (Pt-100 and SPRT only)	0 °C to 45 °C	I_DI_S_ALM_01_01_A_17: 2017/06 in thermostatic bathes	10 mK	Comparison with standard platinum resistance thermometers
Direct reading thermometers with resistance sensor	3 °C to 45 °C	I_DI_S_ALM_01_01_A_16: 2017/06 in thermostatic bathes	0.1 K	Comparison with resistance thermometers
Direct reading thermometers with thermocouple sensor	3 °C to 45 °C	I_DI_S_ALM_01_01_A_16: 2017/06 in thermostatic bathes	0.3 K	

Abbreviations used:

- DIN Deutsches Institut für Normung e.V. – German institute for standardization
- DKD-R Guideline of the Deutscher Kalibrierdienst (DKD), published by the Physikalisch-Technische Bundesanstalt (PTB)
- I_DI_S Calibration instruction of the Carl Zeiss Industrielle Messtechnik GmbH

Valid from: 09.11.2022

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