Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-21703-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **28.09.2021**

Date of issue 28.09.2021

Holder of certificate:

Carl Zeiss IQS Deutschland GmbH
Carl-Zeiss-Straße 22, 73447 Oberkochen

Calibration in the fields:

Dimensional quantities

Coordinate measuring technology

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

[a)] 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 may be found respectively in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH https://www.dakks.de/en/content/accredited-bodies-dakks.

Abbreviations used: see last page

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 Coordinate measuring machines using a contacting probing system and control software CALYPSO, CMM-OS and CALIGO, Software of Carl Zeiss Industrielle Messtechnik GmbH, Oberkochen, GER	Coordinate measuring machines featuring a measuring volume with a space diagonal of ≤ 3818 mm	Calibration of metrological characteristics according to guideline: DKD-R 4-3: part 18.1:2018 and the following standards DIN EN ISO 10360		
		Determination of length measurement deviations E_0 and E_{150} using step gauges made of steel or glass ceramics according to DIN EN ISO 10360-2:2010	For l up to 1100 mm: 0.04 µm + 0.14 · 10^{-6} · l For l up to 1980 mm: 0.08 µm + 0.25 · 10^{-6} · l For l up to 2520 mm: 0.2 µm + 0.4 · 10^{-6} · l Temperature compensation with external temperature measurement: For l up to 1100 mm: 0.04 µm + 0.47 · 10^{-6} · l For l up to 1980 mm: 0.08 µm + 0.53 · 10^{-6} · l For l up to 2520 mm: 0.2 µm + 0.61 · 10^{-6} · l with ΔT = 0.4 K	l = measured length
		Determination of repeatability range R_0 using step gauges made of steel or glass ceramics according to DIN EN ISO 10360-2:2010	0.022 µm	
		Determination of single-stylus form error $P_{\text{Form.Sph.1x25:SS:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	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.

On-site Calibration

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
		Determination single-stylus size error $P_{\text{Size.Sph.1x25:SS:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	0.095 µm	
		Determination of radial 4-axis deviation FR on two ball standards according to DIN EN ISO 10360-3:2000	0.08 µm	The distance between ball and axis of rotary table is 206 mm.
		Determination of tangential 4-axis deviation FT on two ball standards according to DIN EN ISO 10360-3:2000	0.07 µm	The distance between ball and the tangent plane is 0 mm.
		Determination of axial 4-axis deviation FA on two ball standards according to DIN EN ISO 10360-3:2000	0.08 µm	The distance between ball and the rotary table plate is 280 mm.
		Determination of scanning mode form error $P_{\text{Form.Sph.Scan:PP:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	0.05 µm	Measurement of a ball standard made of ceramics with a diameter of 25 mm.
		Determination of scanning mode time $\tau_{\text{Sph.Scan:PP:Tact}}$ according to DIN EN ISO 10360-5:2020	0.82 s	
		Determination of multi-stylus form error $P_{\text{Form.Sph.5x25:MS:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	0.05 µm	
		Determination of multi-stylus size error $P_{\text{Size.Sph.5x25:MS:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	0.095 µm	
		Determination of multi-sytlus location error $L_{\text{Dia.5x25:MS:Tact}}$ using a ball standard according to DIN EN ISO 10360-5:2020	0.05 µm	

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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
Coordinate measuring machines using a contacting probing system and control software CALYPSO, CMM-OS and CALIGO, Software of Carl Zeiss Industrielle Messtechnik GmbH, Oberkochen, GER	Coordinate measuring machines featuring a measuring volume with a space diagonal of ≤ 20 m	Calibration of metrological characteristics according to guideline: DKD-R 4-3: part 18.1:2018 and the following standards DIN EN ISO 10360		
		Determination of length measurement deviation E_0 using laser tracer according to DIN EN ISO 10360-2:2010	0.22 µm + 0.33 · 10^{-6} · l	The transition from the unidirectional laser measurement to bidirectional, tactile measurement, is performed by a ball connection measurement. Also for CMM in duplex-measuring mode.
		Determination of repeatability range R_0 using laser tracer according to DIN EN ISO 10360-2:2010	0.22 µm	
Coordinate measuring machines using a CT sensor technology and control software CALYPSO, Software of Carl Zeiss Industrielle Messtechnik GmbH, Oberkochen, GER	Coordinate measuring machines featuring a measuring volume with a space diagonal of ≤ 171 mm	Calibration of metrological characteristics according to guidelines: DKD-R 4-3: part 18.1:2018 VDI/VDE 2630 part 1.3:2011		
		Determination of deviation in ball distance $S_{D(TS)}$ using CT test specimen according to VDI/VDE 2630 part 1.3:2011	0.5 µm	
		Determination of length measurement deviation $E_{(TS)}$ using CT test equipment according to VDI/VDE 2630 part 1.3:2011	0.86 µm	

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		Determination of probing deviation size $P_{S(TS)}$ using CT test equipment according to VDI/VDE 2630 part 1.3:2011	0.47 µm	
		Determination of probing deviation form $P_{F(TS)}$ using CT test equipment according to VDI/VDE 2630 part 1.3:2011	0.42 µm	
Coordinate measuring machines using an optical probing system and control software CALYPSO, ZAPHIRE, Software of Carl Zeiss Industrielle Messtechnik GmbH, Oberkochen, GER	Coordinate measuring machines featuring a measuring volume with a surface diagonal ≤ 440 mm	Calibration of metrological characteristics according to guidelines: DKD-R 4-3: part 18.1:2018 and the following standard DIN EN ISO 10360-7:2011		
		Determination of length measurement deviations E_U and E_{UXY} using line scale made of glass according to DIN EN ISO 10360-7:2011	$0.08\ \mu m + 0.22 \cdot 10^{-6} \cdot l$ Temperature compensation with external temperature measurement: $0.08\ \mu m + 0.31 \cdot 10^{-6} \cdot l$ with $\Delta T = 0.4$ K	l = measured length
		Determination of repeatability range R_U and R_{UXY} by line scale made of glass according to DIN EN ISO 10360-7:2011	0.082 µm	
		Determination of probing deviation P_{F2D} on a circle standard according to DIN EN ISO 10360-7:2011	0.041 µm	not with ZAPHIRE Software
		Determination of probing deviation P_{FV2D} on a circle standard according to DIN EN ISO 10360-7:2011	0.041 µm	
		Determination of probing deviation P_{S2D} on a circle standard according to DIN EN ISO 10360-7:2011	0.13 µm	not with ZAPHIRE Software

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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
		Determination of probing deviation P_{SV2D} on a circle standard according to DIN EN ISO 10360-7:2011	0.13 µm	

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
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.
VDI	Verein Deutscher Ingenieure e.V.

[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.