DAkkS
Deutsche
Akkreditierungsstelle

Accreditation

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

Mahr GmbH
Carl-Mahr-Straße 1, 37073 Göttingen

meets the requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment activities listed in the annex to this certificate. This includes additional existing legal and normative requirements for the calibration laboratory, including those in relevant sectoral schemes, provided they are explicitly confirmed in the annex to this certificate.

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 only applies in connection with the notices of 02.01.2024 with accreditation number D-K-15074-01.
It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 5 pages.

Registration number of the accreditation certificate: **D-K-15074-01-00**

Berlin, 02.01.2024 Dr. Florian Witt
Head of Technical Unit

Translation issued: 02.01.2024 Dr. Florian Witt
Head of Technical Unit

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).

See notes overleaf

Deutsche Akkreditierungsstelle GmbH

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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

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Annex to the Accreditation Certificate D-K-15074-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **02.01.2024**

Date of issue: 02.01.2024

Holder of accreditation certificate:

Mahr GmbH
Carl-Mahr-Straße 1, 37073 Göttingen

with the location

Mahr GmbH
Carl-Mahr-Straße 1, 37073 Göttingen

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 general with the principles of DIN EN ISO 9001.

Calibration in the fields:

Dimensional quantities

Length

- **Roughness**
- **Form error**
- **Contours**
- **Stylus instruments** [a)]
- **Length measuring devices** [a)]

[a)] **also on-site calibration**

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

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length				
Groove depth *Pt* and *d* on depth setting standards	0.2 µm to 12 µm	DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 5436-1:2000 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022	0.03 µm	
Roughness on extra fine roughness standards *Ra* *Rz* *Rmax, Rzx(l)*	0.025 µm to 0.1 µm 0.15 µm to 0.8 µm 0.15 µm to 0.8 µm	DIN 4768:1990 DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 4288:1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022	0.06 · *Ra* 0.07 · *Rz* 0.09 · *Rmax* 0,09 · *Rzx(l)*	
Roughness on roughness standards and Rk-Standards *Ra* *Rz* *Rmax, Rzx(l)*	0.1 µm to 4 µm 0.8 µm to 20 µm 0.8 µm to 20 µm	DIN 4768:1990 DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 4288:1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022	0.025 · *Ra* 0.030 · *Rz* 0.035 · *Rmax* 0.035 · *Rzx(l)*	
Roughness on roughness standards *Rpk* *Rk* *Rvk*	On surfaces in the range: 0.1 µm ≤ *Ra* ≤ 4 µm 0.8 µm ≤ *Rz* ≤ 20 µm	DIN EN ISO 13565-1:1998 DIN EN ISO 13565-2:1998 DIN EN ISO 16610-31:2015 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022	0,10 · *Rpk* 0,06 · *Rk* 0,09 · *Rvk* *Rk-Standards:* 0,05 · *Rvk*	
Mr1, Rmrk1 *Mr2, Rmrk2*			3 % 5 %	Relative measuring uncertainty relative to 100 % material ratio
Roughness on roughness standards *Ra* *Rz* *Rmax, Rzx(l)*	0.1 µm to 4 µm 0.8 µm to 20 µm 0.8 µm to 20 µm	DIN 4768:1990 DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 4288:1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022	0.015 · *Ra* 0.015 · *Rz* 0.020 · *Rmax* 0,020 · *Rzx(l)*	If necessary, the filter cutoff wavelength λc can be used one level lower or higher than specified in ISO 4288:1998

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range			Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Stylus instruments (Surface) to DIN EN ISO 3274:1998				DKD-R 4-2 Blatt 2:2018 DIN EN ISO 12179:2000 DIN 4768:1990 DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 4288:1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022		$U_{standard}$ is the measuring uncertainty of the standards used. Smaller measuring ranges for which standards are available can also be calibrated.
Groove depth *Pt* and *d*	0.2 µm	to	12 µm		$U_{standard}$ + 0.01 µm	
Ra	0.1 µm	to	4 µm		$U_{standard}$ + 0.01 · *Ra*	
Rz	0.8 µm	to	20 µm		$U_{standard}$ + 0.01 · *Rz*	
Rmax, Rzx(l)	0.8 µm	to	20 µm		$U_{standard}$ + 0.01 · *Rmax* $U_{Standard}$ + 0,01 · *Rzx(l)*	
Stylus instruments (Contour) to DIN EN ISO 3274 and VDI/VDE Bl.1:2023				MK03/07:2021		The measuring uncertainty of mechanical scanning of contour standards and contour stylus instruments of the Mahr GmbH
Distance X		to	100 mm		1.25 µm	
Distance Z		to	10 mm		1.1 µm	
Radii	2 mm	to	12 mm		1.6 µm	
Angle	40°	to	135°		0.025°	
Straightness		to	20 µm		0.36 µm	
Roundness standards Roundness deviation		to	0.1 µm	DIN ISO 1101:2014	0.025 µm	Diameter: 3 mm to 100 mm
Magnification standards Roundness deviation for cylinder with flat area (flick)	0.5 µm	to	20 µm		0.05 µm + 2.5 · 10^{-2} · *RON*t	Diameter: 3 mm to 100 mm
Magnification standards Roundness deviation Multi-wave standard		to	20 µm		0.1 µm + 2.5 · 10^{-2} · *RON*t	Diameter: 50 mm to 150 mm
Cylinder square Roundness deviation		to	20 µm	DIN ISO 1101:2014	0.1 µm + 2.5 · 10^{-2} · *RON*t	Diameter: 3 mm to 100 mm
Straightness deviation of the generatices		to	20 µm		0.2 µm + 2.0 · 10^{-2} · *STR*t	Length: 10 mm to 400 mm
Parallelism deviation of the generatices		to	20 µm		0.3 µm + 1.5 · 10^{-2} · *PAR*t	*RON*t = roundness deviation *STR*t = Straightness deviation *PAR*t = Parallelism deviation *CYL*t = Cylindricity deviation
Cylindricity deviation		to	20 µm		0.4 µm + 3.0 · 10^{-2} · *CYL*t	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Contour standards X length Lateral distances	5 mm to 100 mm	Substitution measurement with reference contour standard	0.6 µm	
Z length Vertical distances	to 10 mm	Procedure according to DIN ISO/TS 15530-3:2008	0.75 µm	
Radii	2 mm to 12 mm		0.75 µm	
Angles	40° to 135°		0.01°	
Dial gauge checkers	to 100 mm	MK03/05:2014 Calibration with traceable electronic linear reference gauge	0.22 µm	
Horizontal Length measuring machines	0 mm to 1000 mm	VDI/VDE/DGQ 2618 part 17.1:2014	$0.08\ \mu m + 0.7 \cdot 10^{-6} \cdot l$	l = measured length The measurement uncertainty of the length measurement uncertainty in mechanical probing of gauge blocks and is valid for horizontal length measuring machines of the Mahr GmbH
	> 1000 mm to 2000 mm		$0.1\ \mu m + 0.5 \cdot 10^{-6} \cdot l$	

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length				
Stylus instruments (Surface) to DIN EN ISO 3274:1998		DKD-R 4-2 Blatt 2:2018 DIN EN ISO 12179:2000 DIN 4768:1990 DIN EN ISO 3274:1998 DIN EN ISO 4287:2010 DIN EN ISO 4288:1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2:2022 DIN EN ISO 21920-3:2022		$U_{standard}$ is the measuring uncertainty of the standards used. Smaller measuring ranges for which standards are available can also be calibrated.
Groove depth *Pt* and *d*	0.2 µm to 12 µm		$U_{standard}$ + 0.01 µm	
Ra	0.1 µm to 4 µm		$U_{standard}$ + 0.01 · *Ra*	
Rz	0.8 µm to 20 µm		$U_{standard}$ + 0.01 · *Rz*	
Rmax, Rzx(l)	0.8 µm to 20 µm		$U_{standard}$ + 0.01 · *Rmax* $U_{Standard}$ + 0,01 · *Rzx(l)*	

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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
Stylus instruments (Contour) to DIN EN ISO 3274 and VDI/VDE BI.1:2023				MK03/07:2021		The measuring uncertainty of mechanical scanning of contour standards and contour stylus instruments of the Mahr GmbH
Distance X		to	100 mm		1.25 µm	
Distance Z		to	10 mm		1.1 µm	
Radii	2 mm	to	12 mm		1.6 µm	
Angle	40°	to	135°		0.025°	
Straightness		to	20 µm		0.36 µm	
Dial gauge checkers		to	100 mm	MK03/05:2014 Calibration with traceable electronic linear reference gauge	0.22 µm	
Horizontal Length measuring machines	0 mm	to	1000 mm	VDI/VDE/DGQ 2618 part 17.1:2014	$0.08\ \mu m + 0.7 \cdot 10^{-6} \cdot l$	l = measured length The measurement uncertainty of the length measurement uncertainty in mechanical probing of gauge blocks and is valid for horizontal length measuring machines of the Mahr GmbH
	> 1000 mm	to	2000 mm		$0.1\ \mu m + 0.5 \cdot 10^{-6} \cdot l$	

Abbreviations used:

CMC	Calibration and measurement capabilities
DIN	Deutsches Institut für Normung e.V.
DKD-R	Guideline on Deutscher Kalibrierdienst (DKD), published by Physikalisch-Technische Bundesanstalt
MK	Calibration instruction of the Mahr GmbH
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik
VDI	Verein Deutscher Ingenieure