DAkkS
Deutsche
Akkreditierungsstelle

Accreditation

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

JENOPTIK Industrial Metrology Germany GmbH
Drachenloch 5, 78052 Villingen-Schwenningen

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 03.11.2023 with accreditation number D-K-15030-01.
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-15030-01-00**

Berlin, 03.11.2023 — Dr. Florian Witt, Head of Technical Unit

Translation issued: 03.11.2023 — 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

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-15030-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **03.11.2023**

Date of issue: 03.11.2023

Holder of accreditation certificate:

JENOPTIK Industrial Metrology Germany GmbH
Drachenloch 5, 78052 Villingen-Schwenningen

with the location

JENOPTIK Industrial Metrology Germany GmbH
Drachenloch 5, 78052 Villingen-Schwenningen

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 instruments** [a)]

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

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.

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	0.15 µm to 12 µm	DIN EN ISO 4287:2010 DIN EN ISO 5436-1:2000 DIN EN ISO 3274:1998 DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022	0.012 µm + 0.8 · 10^{-3} · Pt 0.012 µm + 0.8 · 10^{-3} · d	Groove depth Pt and d in mm
	> 12 µm to 5500 µm		0.022 µm + 0.036 · 10^{-3} · Pt 0.022 µm + 0.036 · 10^{-3} · d	
Roughness on geometric standards		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		If necessary, the cutoff length λ_c can be select-ed one step shorter or up to two steps longer than specified in the standard, but not more than λ_c = 2,5 mm
Rz	0.5 µm to 20 µm		1.5 % · Ra 1.5 % · Rz	
$Rmax$, $Rz1max$	0.5 µm to 20 µm		2.0 % · $Rmax$ 2.0 % · $Rz1max$	
$Rzx(l)$	0.5 µm to 20 µm		2.0 % · $Rzx(l)$	
RSm	40 µm to 400 µm		1.5 µm	
Ra	0,1 µm to 3,5 µm	Steel test specification 1940 SEP 1940:2002 DIN EN 10049:2014 DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022	5.0 % · Ra	Depending on the profile height other intersection line distances can be chosen (as specified)
Rz	0,5 µm to 20 µm		5.0 % · Rz	
RPc	25 ≤ RPc ≤ 150		2.0 cm^{-1}	
Rpc	25 ≤ Rpc ≤ 150		2.0 cm^{-1}	
Roughness on aperiodic roughness standards		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		
Ra	0.1 µm to 3,5 µm		2.5 % · Ra	
Rz	0.5 µm to 20 µm		3.0 % · Rz	
$Rmax$, $Rz1max$	0.5 µm to 20 µm		3.5 % · $Rmax$ 3.5 % · $Rz1max$	
$Rzx(l)$	0.5 µm to 20 µm		3.5 % · $Rzx(l)$	
Rpk Rk Rvk	On surfaces in the range	DIN 4776:1990 DIN EN ISO 13565-1:1998 DIN EN ISO 13565-2:1998	9.0 % · Rpk 5.0 % · Rk 8.0 % · Rvk	
$Mr1$, $Rmrk1$ $Mr2$, $Rmrk2$	0.1 µm ≤ Ra ≤ 3.5 µm 0.5 µm ≤ Rz ≤ 20 µm	DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022 DIN EN ISO 16610-31:2017	2.0 % 2.0 %	Relative measuring uncertainty relative to 100 % material ratio
Ra	0.1 µm to 3.5 µm	Steel test specification 1940 SEP 1940:2002 DIN EN 10049:2014 DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022	8 % · Ra	Depending on the profile height other intersection line distances can be chosen (as specified)
Rz	0.5 µm to 20 µm		8 % · Rz	
RPc	25 ≤ RPc ≤ 100		2.0 cm^{-1}	
Rpc	25 ≤ Rpc ≤ 100		2.0 cm^{-1}	

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Roughness on extra fine aperiodic roughness standards *Ra* *Rz* *Rmax, Rz1max* *Rzx(l)*	 0.015 µm to 0.1 µm 0.1 µm to 0.8 µm 0.1 µm to 0.8 µm 0.1 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	 6 % · Ra 7 % · Rz 9 % · Rmax 9 % · Rzx(l)	
Rpk *Rk* *Rvk*	On surfaces in the range	DIN 4776:1990 DIN EN ISO 13565-1:1998 DIN EN ISO 13565-2:1998	10 % · *Rpk* 6 % · *Rk* 9 % · *Rvk*	
Mr1, Rmrk1 *Mr2, Rmrk2*	0.015 µm ≤ *Ra* ≤ 0.1 µm 0.1 µm ≤ *Rz* ≤ 0.8 µm	DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022 DIN EN ISO 16610-31:2017	2.0 % 2.0 %	Relative measuring uncertainty relative to 100 % material ratio
Roundness standards Roundness deviation	 to 10 µm > 10 µm to 20 µm	DIN EN ISO 1101:2017 DIN EN ISO 12181-1:2011 DIN EN ISO 12181-1:2011 DKD-R 4-4:2018	 0.025 µm 0.1 µm	Diameter: 5 mm to 300 mm
Magnification standards (flick standards) Roundness deviation	 2 µm to 20 µm > 20 µm to 60 µm > 60 µm to 500 µm		 0.2 µm 0.3 µm 0.5 % of measured value	
Cylindrical form standards Roundness deviation	 to 20 µm	DIN EN ISO 1101:2017 DIN EN ISO 12181-1:2011 DIN EN ISO 12181-1:2011 DKD-R 4-4:2018	 0.1 µm	Diameter: 3 mm to 300 mm Length: 5 mm to 300 mm
Straightness deviation of the generatices Length: 2 mm to 300 mm	 to 10 µm		 0.2 µm	
Length: 2 mm to 100 mm	> 10 µm to 20 µm		0.2 µm	
Length: > 100 mm to 300 mm			0.3 µm	
Parallelism deviation of the generatices Length: 2 mm to 300 mm	 to 10 µm		 0.3 µm	
Length: 2 mm to 100 mm Length: > 100 mm to 300 mm	> 10 µm to 20 µm		0.3 µm 0.4 µm	

Permanent Laboratory

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 according to VDI 2629 part 1:2008 Procedure according to DIN EN ISO 15530-3:2012	0.6 µm	
Z Length Vertical distances	to 10 mm		0.75 µm	
Radii	2 mm to 12 mm		0.75 µm	
Angles	40° to 135°		0.01°	
Stylus instruments according to DIN 4772:1979 DIN EN ISO 3274:1998 Groove depth *Pt* and *d* *Ra* *Rz* *Rmax, Rz1max* *Rzx(l)* *RSm*	0.15 µm to 5500 µm 0.015 µm to 3.5 µm 0.1 µm to 20 µm 0.1 µm to 20 µm 0.1 µm to 20 µm 40 µm to 400 µm	DKD-R 4-2 Blatt 2:2018 DIN EN ISO 12179:2020 E	U_{normal} + 0.01 µm U_{normal} + 1 % · *Ra* U_{normal} + 1 % · *Rz* U_{normal} + 1 % · *Rmax* U_{normal} + 1 % · *Rzx(l)* U_{normal} + 1 µm	U_{normal} is the measurement uncertainty of the standards used. Smaller measuring ranges for which standards are available can also be calibrated.
Rpk *Rk* *Rvk*	On surfaces in the range 0.015 µm ≤ *Ra* ≤ 3.5 µm 0.1 µm ≤ *Rz* ≤ 20 µm	DIN 4776: 1990 DIN EN ISO 13565-1: 1998 DIN EN ISO 13565-2: 1998 DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022 DIN EN ISO 16610-31:2017	U_{normal} + 1 % · *Rpk* U_{normal} + 1 % · *Rk* U_{normal} + 1 % · *Rvk*	
Mr1, Rmrk1 *Mr2 Rmrk2*			U_{normal} + 1 % U_{normal} + 1 %	Relative measuring uncertainty relative to 100 % material ratio
Optoelectronic length and diameter measuring devices (Shaft measuring systems)		Shadow image method QMA: Kalibrierung von Wellenmessgeräten: 2021-10 (english: Calibration of shaft measuring systems 2021-10)		Smaller measuring ranges for which standards are available can also be calibrated
Diameter	to 320 mm		0.4 µm + 0.6 · 10^{-6} · *d*	*d* = measured diameter
Length	to 1200 mm		0.5 µm + 0.6 · 10^{-6} · *l*	*l* = measured length

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Length				
Stylus instruments according to DIN 4772:1979 DIN EN ISO 3274:1998				U_{normal} is the measurement uncertainty of the standards used. Smaller measuring ranges for which standards are available can also be calibrated.
Groove depth Pt and d	0.15 µm to 5500 µm	DKD-R 4-2 part 2:2010	U_{normal} + 0.01 µm	
Ra	0.015 µm to 3.5 µm	DIN EN ISO 12179:2020 E	U_{normal} + 1 % · Ra	
Rz	0.1 µm to 20 µm	DIN 4768: 1990	U_{normal} + 1 % · Rz	
$Rmax$, $Rz1max$	0.1 µm to 20 µm	DIN EN ISO 3274: 1998	U_{normal} + 1 % · $Rmax$	
$Rzx(l)$	0.1 µm to 20 µm	DIN EN ISO 4287: 2010	U_{normal} + 1 % · $Rzx(l)$	
RSm	40 µm to 400 µm	DIN EN ISO 4288: 1998 DIN EN ISO 16610-21:2013 DIN EN ISO 21920-2: 2022 DIN EN ISO 21920-3: 2022	U_{normal} + 1 µm	
Rpk	On surfaces in the range 0.015 µm ≤ Ra ≤ 3,5 µm 0.1 µm ≤ Rz ≤ 20 µm		U_{normal} + 1 % · Rpk	
Rk			U_{normal} + 1 % · Rk	
Rvk			U_{normal} + 1 % · Rvk	
$Mr1$, $Rmrk1$ $Mr2$,$Rmrk2$			U_{normal} + 1 % U_{normal} + 1 %	Relative measuring uncertainty relative to 100 % material ratio
Optoelectronic length and diameter measuring devices (Shaft measuring systems)		Shadow image method QMA: Kalibrierung von Wellenmessgeräten: 2021-10 (english: Calibration of shaft measuring systems 2021-10)		Smaller measuring ranges for which standards are available can also be calibrated.
Diameter	to 320 mm		0.4 µm + 0.6 · 10^{-6} · d	d = measured diameter
Length	to 1200 mm		0.5 µm + 0.6 · 10^{-6} · l	l = measured length

Abbreviations used:

CMC	Calibration and measurement capabilities
DIN	German Institute for Standardization e.V.
DKD-R	Guidelines of the German Calibration Service (DKD), published by the Physikalisch-Technische Bundesanstalt
QMA	Internal documentation of JENOPTIC Industrial Metrology Germany GmbH
VDI	Association of German Engineers e.V.