

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

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

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

Dimensional quantities

Length

- **Roughness**
- **Form Error**
- **Contours**
- **Stylus instruments ^{a)}**
- **Length measuring instruments ^{a)}**

^{a)} also on-site calibration

The accreditation certificate shall only apply in connection with the notice of accreditation of 02.05.2022 with the accreditation number D-K-15030-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 5 pages.

Registration number of the certificate: **D-K-15030-01-00**

Berlin,
02.05.2022

Dr. Florian Witt
Head of technical unit

Translation issued:
02.05.2022



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 at <https://www.dakks.de/en/accredited-bodies-search.html>.

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

See notes overleaf.

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The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS.

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

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-15030-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 02.05.2022

Date of issue 02.05.2022

Holder of certificate:

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

Calibration in the fields:

Dimensional quantities

Length

- **Roughness**
- **Form Error**
- **Contours**
- **Stylus instruments ^{a)}**
- **Length measuring instruments ^{a)}**

^{a)} also 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 can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de/en/accredited-bodies-search.html>.*

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 accreditation certificate D-K-15030-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Length Groove depth P_t and d on depth setting standards	0,15 μm to 12 μm	DIN EN ISO 4287:2010 DIN EN ISO 5436-1:2000	$0,012 \mu\text{m} + 0,8 \cdot 10^{-3} \cdot P_t$ $0,012 \mu\text{m} + 0,8 \cdot 10^{-3} \cdot d$	Groove depth P_t and d in mm
	>12 μm to 5500 μm	DIN EN ISO 3274:1998	$0,022 \mu\text{m} + 0,036 \cdot 10^{-3} \cdot P_t$ $0,022 \mu\text{m} + 0,036 \cdot 10^{-3} \cdot d$	
Roughness on geometric standards R_a R_z R_{max} , $R_z l_{max}$ R_{Sm}	0,1 μm to 3,5 μm 0,5 μm to 20 μm 0,5 μm to 20 μm 40 μm to 400 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	3 % $\cdot R_a$ 3 % $\cdot R_z$ 3 % $\cdot R_{max}$ 3 μm	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 $\lambda_c = 2,5$ mm
R_a R_z RP_c	0,1 μm to 3,5 μm 0,5 μm to 20 μm $25 \leq RP_c \leq 150$	Steel test specification 1940 SEP 1940:2002 DIN EN 10049:2014	5 % $\cdot R_a$ 5 % $\cdot R_z$ 2 cm^{-1}	Depending on the profile height other intersection line distances can be chosen (as specified)
Roughness on aperiodic roughness standards R_a R_z R_{max} , $R_z l_{max}$	0,1 μm to 3,5 μm 0,5 μm to 20 μm 0,5 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	5 % $\cdot R_a$ 5 % $\cdot R_z$ 5 % $\cdot R_{max}$	
R_{pk} R_k R_{vk}	On surfaces in the range	DIN 4776:1990 DIN EN ISO 13565-1:1998 DIN EN ISO 13565-2:1998	4 % $\cdot R_z$ 5 % $\cdot R_z$ 4 % $\cdot R_z$	
$Mr1$ $Mr2$	0,1 $\mu\text{m} \leq R_a \leq 3,5 \mu\text{m}$ 0,5 $\mu\text{m} \leq R_z \leq 20 \mu\text{m}$		4 % 6 %	Relative measuring uncertainty relative to 100 % material ratio
R_a R_z RP_c	0,1 μm to 3,5 μm 0,5 μm to 20 μm $25 \leq RP_c \leq 100$	Steel test specification 1940 SEP 1940:2002 DIN EN 10049:2014	8 % $\cdot R_a$ 8 % $\cdot R_z$ 2 cm^{-1}	Depending on the profile height other intersection line distances can be chosen (as specified)

¹⁾ The expanded uncertainties according to EA-4/02 M:2022 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.

Annex to the accreditation certificate D-K-15030-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Roughness on extra fine aperiodic roughness standards <i>Ra</i> <i>Rz</i> <i>Rmax, Rz/Imax</i>	0,015 µm to 0,1 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	8 % · <i>Ra</i> 9 % · <i>Rz</i> 10 % · <i>Rmax</i>	
<i>Rpk</i> <i>Rk</i> <i>Rvk</i>	On surfaces in the range	DIN 4776:1990 DIN EN ISO 13565-1:1998 DIN EN ISO 13565-2:1998	5 % · <i>Rz</i> 6 % · <i>Rz</i> 5 % · <i>Rz</i>	
<i>Mr1</i> <i>Mr2</i>	0,015 µm ≤ <i>Ra</i> ≤ 0,1 µm 0,1 µm ≤ <i>Rz</i> ≤ 0,8 µm		4 % 4 %	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	0,02S 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 generatrices Length: 2 mm to 300 mm	to 10 µm		0,2 µm	
Length: 2 mm to 100 mm			0,2 µm	
Length: > 100 mm to 300 mm	> 10 µm to 20 µm		0,3 µm	
Parallelism deviation of the generatrices 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	

¹⁾ The expanded uncertainties according to EA-4/02 M:2022 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.

Annex to the accreditation certificate D-K-15030-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks		
Contour standards		Substitution measurement with reference contour standard according to VDI 2629 part 1:2008 Procedure according to DIN EN ISO 15530-3:2012				
X Length	5 mm to 100 mm				0,6 µm	
Lateral distances					0,75 µm	
Z Length	to 10 mm				0,75 µm	
Vertical distances					0,75 µm	
Radii	2 mm to 12 mm	0,01°				
Angles	40° to 135°					
Stylus instruments according to DIN 4772:1979 DIN EN ISO 3274:1998		DKD-R 4-2 Blatt 2:2018 DIN EN ISO 12179:2020 E		<i>U</i> _{normal} is the measurement uncertainty of the standards used. Smaller measuring ranges for which standards are available can also be calibrated.		
Groove depth <i>Pt</i> and <i>d</i>	0,15 µm to 5500 µm				<i>U</i> _{normal} + 0,01 µm	
<i>Ra</i>	0,015 µm to 3,5 µm				<i>U</i> _{normal} + 1 % · <i>Ra</i>	
<i>Rz</i>	0,1 µm to 20 µm				<i>U</i> _{normal} + 1 % · <i>Rz</i>	
<i>Rmax</i> , <i>Rz1max</i> <i>RSm</i>	0,1 µm to 20 µm 40 µm to 400 µm				<i>U</i> _{normal} + 1 % · <i>Rmax</i> <i>U</i> _{normal} + 1 µm	
<i>Rpk</i> <i>Rk</i> <i>Rvk</i>	On surfaces in the range	<i>U</i> _{normal} + 1 % · <i>Rz</i> <i>U</i> _{normal} + 1 % · <i>Rz</i> <i>U</i> _{normal} + 1 % · <i>Rz</i>				
<i>Mr1</i> <i>Mr2</i>	0,015 µm ≤ <i>Ra</i> ≤ 3,5 µm 0,1 µm ≤ <i>Rz</i> ≤ 20 µm	<i>U</i> _{normal} + 1 % <i>U</i> _{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 · <i>d</i>	<i>d</i> = measured diameter
Length	to 1200 mm				0,5 µm + 0,6 · 10 ⁻⁶ · <i>l</i>	<i>l</i> = measured length

¹⁾ The expanded uncertainties according to EA-4/02 M:2022 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.

Annex to the accreditation certificate D-K-15030-01-00

On-site Calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Length Stylus instruments according to DIN 4772:1979 DIN EN ISO 3274:1998 Groove depth Pt and d Ra Rz $Rmax, Rz\ lmax$ 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 40 μm to 400 μm	DKD-R 4-2 part 2:2010 DIN EN ISO 12179:2020 E	$U_{normal} + 0,01 \mu m$ $U_{normal} + 1 \% \cdot Ra$ $U_{normal} + 1 \% \cdot Rz$ $U_{normal} + 1 \% \cdot Rmax$ $U_{normal} + 1 \mu m$	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 $0,015 \mu m \leq Ra \leq 3,5 \mu m$ $0,1 \mu m \leq Rz \leq 20 \mu m$		$U_{normal} + 1 \% \cdot Rz$ $U_{normal} + 1 \% \cdot Rz$ $U_{normal} + 1 \% \cdot Rz$	
$Mr1$ $Mr2$			$U_{normal} + 1 \%$ $U_{normal} + 1 \%$	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		Smaller measuring ranges for which standards are available can also be calibrated.
Diameter	to 320 mm	(english: Calibration of shaft measuring systems 2021-10)	$0,4 \mu m + 0,6 \cdot 10^{-6} \cdot d$	d = measured diameter
Length	to 1200 mm		$0,5 \mu m + 0,6 \cdot 10^{-6} \cdot l$	l = measured length

Abbreviations used:

CMC	Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DIN	Deutsches Institut für Normung e.V.
DKD-R	Richtlinie des Deutschen Kalibrierdienstes (DKD), herausgegeben von der Physikalisch-Technischen Bundesanstalt
QMA	Internal documentation of JENOPTIC Industrial Metrology Germany GmbH
VDI	Verein Deutscher Ingenieure e.V.

¹⁾ The expanded uncertainties according to EA-4/02 M:2022 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.