DAkkS
Deutsche
Akkreditierungsstelle

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

Mahr GmbH
Carl-Mahr-Straße 1, 37073 Göttingen

that its calibration laboratory

Mahr GmbH, Standort Esslingen
Reutlinger Straße 48, 73728 Esslingen

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out calibrations in the following fields:

Dimensional quantities

Length

- **Gauge blocks**
- **Diameter**
- **Form error**
- **Length measuring instruments**
- **Length measuring devices**
- **Thread**

The accreditation certificate shall only apply in connection with the notice of accreditation of 17.05.2017 with the accreditation number D-K-15074-02 and is valid until 16.05.2022. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 4 pages.

Registration number of the certificate: **D-K-15074-02-00**

Braunschweig, 17.05.2017	Dr. Michael Wolf Head of Division	Translation issued: 17.05.2017	M. Wolf Head of Division

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

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

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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-15074-02-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 17.05.2017 to 16.05.2022 Date of issue: 17.05.2017

Holder of certificate:

Mahr GmbH
Carl-Mahr-Straße 1, 37073 Göttingen

with its calibration laboratory

Mahr GmbH, Standort Esslingen
Reutlinger Straße 48, 73728 Esslingen

Head:	Dipl.-Ing. Ulrich Börner
Deputy:	Martin Treiber
	Dipl.-Ing. (FH) Jürgen Bröckl

Accredited as calibration laboratory since: 24.03.1987

Calibration in the fields:

Dimensional quantities

Length

- **Gauge blocks**
- **Diameter**
- **Form error**
- **Length measuring instruments**
- **Length measuring devices**
- **Thread**

Abbreviations used: see last page

Permanent Laboratory

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1]	Remarks
Length				
Gauge blocks made of steel according to DIN EN ISO 3650:1999	0.5 mm to 100 mm featuring the nominal values of the standards	DAkkS-DKD-R 4-3 part 3.1:2010 Measurement of the deviation of the central length l_c from the nominal value l_n by comparison measurement	For the central length: 0.05 µm + 0.5 · 10^{-6} · l For the deviations f_0 and f_u from the central length: 0.05 µm	l = gauge block length Measuring surface quality as stated in Manuel rsp. in the test specifications
	0.5 mm to 100 mm in the nominal dimensions, which differ of the standard (unusual nominal length)	Measurement of the deviations f_0 and f_u from the central length by 5 points comparison For the smallest meas-urement uncertainties, the wringability and the wringing characteristics of both measuring surfaces must be checked using an appropriate optical flat	For the central length: 0.07 µm + 0.5 · 10^{-6} · l For the deviations f_0 and f_u from the central length: 0.05 µm	
Gauge blocks made of ceramics or tungsten carbide according to DIN EN ISO 3650:1999	0.5 mm to 100 mm featuring the nominal values of the standards		For the central length: 0.07 µm + 0.6 · 10^{-6} · l For the deviations f_0 and f_u from the central length: 0.05 µm	
Pairs of gauge blocks made of steel or tungsten carbide according to DIN EN ISO 3650:1999	0.5 mm to 100 mm	DAkkS-DKD-R 4-3 part 3.1:2010 Measurement of the difference of the central lengths of gauge blocks with the same nominal length, respectively of difference of the central lengths up to 10 µm Measurement of the deviations f_0 and f_u from the central length by 5 points com-parison measurement	Fort he difference oft he central length oft he pairs: 0.03 µm For the deviations f_0 and f_u from the central length: 0.03 µm (only for the nominal values 1.005 mm and 1.01 mm) 0.05 µm (for the remaining values)	
Cylindrical setting gauges, Setting ring gauges Diameter	10 mm to 100 mm	DAkkS-DKD-R 4-3 part 4.1:2010	0.4 µm + 5 · 10^{-6} · d	d = measured diameter
Straigthness deviation and Parallelism deviation of surface lines			0.5 µm	
Roundness deviation		Cut-off wave number = 150	0.1 µm	
Cylindrical setting gauges, Setting plug gauges Diameter	3 mm to 100 mm	DAkkS-DKD-R 4-3 part 4.1:2010	0.25 µm + 5 · 10^{-6} · d	
Straigthness deviation and Parallelism deviation of surface lines			0.5 µm	
Roundness deviation		Cut-off wave number = 150	0.1 µm	

[1] The best measurement capabilities are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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.

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1)]	Remarks
Measuring pins Diameter	0.17 mm to 100 mm	DAkkS-DKD-R 4-3 part 4.2:2010	0.25 µm + 5 · 10^{-6} · d	d = measured diameter
Straigthness deviation and Parallelism deviation of surface lines	3 mm to 100 mm		0.5 µm	
Roundness deviation		Cut-off wave number = 150	0.1 µm	
Calipers for external, internal and depth dimensions	0 mm to 500 mm	DAkkS-DKD-R 4-3 part 9.1:2010	15 µm + 15 · 10^{-6} · l	l = measured length
Micrometers	0 mm to 200 mm	DAkkS-DKD-R 4-3 part 10.1:2010	2 µm + 10 · 10^{-6} · l	scale interval 1 µm, for higher scale intervals the measurement uncertainty will rise 200 mm = final value of the measuring range
Reference gauges for micrometers	0 mm to 200 mm	DAkkS-DKD-R 4-3 part 4.4:2010	1 µm + 10 · 10^{-6} · l	
Dial gauges	to 30 mm	DAkkS-DKD-R 4-3 part 11.1:2010	0.8 µm + 12 · 10^{-6} · l	scale interval 1 µm, for higher scale intervals the measurement uncertainty will rise
Dial indicators	to 3 mm	DAkkS-DKD-R 4-3 part 11.2:2010	0.5 µm	
Lever gauges	to 1.6 mm	DAkkS-DKD-R 4-3 part 11.3:2010	0.7 µm	
Inductive probe and measuring device	to 10 mm	DAkkS-DKD-R 4-3 part 14.1:2010	0.5 µm	
Inductive probe without measuring device	to 10 mm		1.2 µm	
Inkrementale Messtaster	0 mm to 100 mm	According to VDI/VDE/DGQ 2618 part 14.1:2010	0.35 µm + 12 · 10^{-6} · l	
Height gauges / Heigth measuring machines	0 mm to 1000 mm	VDI/VDE/DGQ 2618 part 16.1:2009	1.7 µm + 1.2 · 10^{-6} · l	

[1)] The best measurement capabilities are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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.

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability [1)]	Remarks
Thread gauges (single-start cylindrical external and internal threads with straight flanks and symmetrical profile)				
External thread Simple pitch diameter with nominal lead 0.25 mm to 6 mm	Nominal diameter 3 mm to 100 mm	DAkkS-DKD-R 4-3 part 4.8:2010, Option 1	3 µm + 10 · 10^{-6} · d	d = pitch diameter
Internal threard Simple pitch diameter with nominal lead 0.25 mm to 6 mm	Nominal diameter 5 mm to 100 mm	DAkkS-DKD-R 4-3 part 4.9:2010, Option 1	3 µm + 10 · 10^{-6} · d	

Abbreviations used:

DAkkS-DKD-R Guideline on Deutsche Akkreditierungsstelle GmbH

[1)] The best measurement capabilities are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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.