

## **Accreditation**



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

#### Baker Hughes Digital Solutions GmbH Robert-Bosch-Straße 3, 50354 Hürth

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 they conform to 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 07.02.2025 with accreditation number D-K-15178-03.

It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 4 pages.

Registration number of the accreditation certificate: D-K-15178-03-00

Berlin, 07.02.2025

Dr. Florian Witt Head of Technical Unit Translation issued:

17.03.2025

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).

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

### 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-15178-03-00 according to DIN EN ISO/IEC 17025:2018

Valid from:

07.02.2025

Date of issue:

17.03.2025

Holder of accreditation certificate:

Baker Hughes Digital Solutions GmbH Robert-Bosch-Straße 3, 50354 Hürth

with the location

Baker Hughes Digital Solutions GmbH Robert-Bosch-Straße 3, 50354 Hürth

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 principles of DIN EN ISO 9001.

Calibrations in the fields:

#### Dimensional quantities Length

Length measuring devices a)

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

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

a) also on-site calibration



#### Annex to the Accreditation Certificate D-K-15178-03-00

The calibration laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use calibration standards or equivalent calibration procedures listed here with different issue dates.

The calibration laboratory maintains a current list of all calibration standards / equivalent calibration procedures within the flexible scope of accreditation.

Valid from:

07.02.2025

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#### Annex to the Accreditation Certificate D-K-15178-03-00

#### **Permanentes Laboratorium**

Kalibrier- und Messmöglichkeiten (CMC)

Calibration item    Calibration item		Kalibrier- und		essmoglichkeiten (CMC)			
Measurement Devices		Range			uncertainty of	Remarks	
Transmitter Rise time/pulse width Voltage 10 V to 450 V  Length Wall thicknesses 0.2 mm to 300 mm Wall thickness Resolution Ultrasonic Testing Devices Transmitter Rise time/pulse width 2.5 ns to 5000 ns Voltage 10 V to 450 V  Receiver Frequency dependence Equivalent input noise level Linearity of the amplification Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  Transmitter  0.2 mm to 300 mm 0.02 mm 0.01 mm  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 2233-1:2021 group 2  DIN EN ISO 323 ns 0.23 ns 0.23 ns 0.23 ns 0.23 ns 0.23 ns 0.24 mc 0.2 kHz 1.6 %  ESH: Full script of the vertical axis  DIN EN ISO 18563-1:2022 group 2	Ultrasonic Thickness		asonic Thickness	EN 15317-01:2014			
Rise time/pulse width 10 ns to 2500 ns Voltage 10 V to 450 V 0.1 %  Length Wall thicknesses 0.2 mm to 300 mm 0.05 mm to 0.1 mm 0.01 mm  Ultrasonic Testing Devices  Transmitter Rise time/pulse width 2.5 ns to 5000 ns Voltage 10 V to 450 V 0.1 %  Receiver Frequency dependence Equivalent input noise level Linearity of the amplification 1 dB to 110 dB  Linearity of the vertical axis 0 % FSH to 100 % FSH to 10	Measurement Devices		asurement Devices	group 2			
Voltage 10 V to 450 V 0.1%  Length Wall thicknesses 0.2 mm to 300 mm 0.02 mm Wall thickness Resolution 0.05 mm to 0.1 mm  Ultrasonic Testing Devices Transmitter Rise time/pulse width 2.5 ns to 5000 ns Voltage 10 V to 450 V 0.1 %  Receiver Frequency dependence 1 nV/vHz to 200 nV/vHz level Linearity of the amplification 1 dB to 110 dB  Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 2233-1:2021 group 2	Transmitter		nsmitter				
Length Wall thicknesses 0.2 mm to 300 mm 0.05 mm to 0.1 mm  Ultrasonic Testing Devices Transmitter Rise time/pulse width Voltage 10 V to 450 V  Receiver Frequency dependence Equivalent input noise level Linearity of the amplification Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  0.2 mm 0.02 mm 0.01 mm  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 22332-1:2021 group 2  DIN EN ISO 2233-1:2022 group 2	Rise time/pulse width	10 ns to 2500 ns	Rise time/pulse width		0.23 ns		
Wall thicknesses 0.2 mm to 300 mm 0.01	Voltage	10 V to 450 V	/oltage		0.1 %		
Wall thickness Resolution 0.05 mm to 0.1 mm 0.01 mm 0.01 mm  Ultrasonic Testing Devices  Transmitter  Rise time/pulse width 2.5 ns to 5000 ns  Voltage 10 V to 450 V 0.1 %  Receiver  Frequency dependence Equivalent input noise level Linearity of the amplification 1 dB to 110 dB  Linearity of the vertical axis 0 % FSH to 100 % FSH axis    Ultrasonic Phased Array Testing Devices	Length		ngth				
Ultrasonic Testing Devices Transmitter Rise time/pulse width Voltage 10 V to 450 V  Receiver Frequency dependence Equivalent input noise level Linearity of the amplification Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 22232-1:2021 group 2  DIN EN ISO 22232-1:2021 group 2  0.23 ns 0.1%  0.2 kHz 1.6 % 235·10-6 dB FSH: Full screen height	Wall thicknesses	0.2 mm to 300 mm	Wall thicknesses		0.02 mm		
Transmitter  Rise time/pulse width  Voltage  10 V to 450 V  Receiver  Frequency dependence Equivalent input noise level Linearity of the amplification  Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  To V to 450 V  0.2 kHz 0.2 kHz 0.2 kHz 1.6 %  235·10-6 dB  FSH: Full scr. height (total screen height)  DIN EN ISO 18563-1:2022 group 2	Wall thickness Resolution	0.05 mm to 0.1 mm	Wall thickness Resolution		0.01 mm		
Rise time/pulse width  Voltage  10 V to 450 V  Receiver  Frequency dependence Equivalent input noise level Linearity of the amplification  Linearity of the vertical axis  Ultrasonic Phased Array Testing Devices  10 V to 450 V  0.23 ns 0.1%  0.24 kHz 1.6%  10 V/VHz 1.6%  235·10-6 dB  FSH: Full scr. height (total screen height)	Ultrasonic Testing Devices		asonic Testing Devices	DIN EN ISO 22232-1:2021			
Voltage 10 V to 450 V 0.1 %  Receiver  Frequency dependence Equivalent input noise level Linearity of the amplification 1 dB to 110 dB  Linearity of the vertical axis 0 % FSH to 100 % FSH 23.84·10·6 % FSH FSH: Full screen height (total screen height)  Ultrasonic Phased Array Testing Devices  Testing Devices 0 0.1 MHz to 30 MHz 0.2 kHz 0.2 k	Transmitter		nsmitter	group 2			
Receiver  Frequency dependence Equivalent input noise level Linearity of the amplification  Linearity of the vertical axis  O % FSH to 100 % FSH  DIN EN ISO 18563-1:2022 Group 2  O .2 kHz  0 .2 kHz  1.6 %  235·10-6 dB  FSH: Full scr. height (total screen height)	Rise time/pulse width	2.5 ns to 5000 ns	Rise time/pulse width		0.23 ns		
Frequency dependence Equivalent input noise level Linearity of the amplification  Linearity of the vertical axis  O.2 kHz  1 nV/vHz to 200 nV/vHz  1 10 dB  235·10-6 dB  23.84·10-6 % FSH  FSH: Full screen height (total screen height)  DIN EN ISO 18563-1:2022 group 2	Voltage	10 V to 450 V	/oltage	,	0.1 %		
Equivalent input noise level  Linearity of the amplification  Linearity of the vertical axis  O % FSH to 100 % FSH  O % FSH to 100 % FSH  DIN EN ISO 18563-1:2022  group 2	Receiver		ceiver				
level Linearity of the amplification  Linearity of the vertical axis  O % FSH to 100 % FSH  O % FSH to 100 % FSH  DIN EN ISO 18563-1:2022  group 2	Frequency dependence	0.1 MHz to 30 MHz	requency dependence		0.2 kHz		
amplification  Linearity of the vertical axis  O % FSH to 100 % FSH to 100 % FSH  DIN EN ISO 18563-1:2022  group 2  Testing Devices  To 110 dB  235-10 dB  FSH: Full scr. height (total screen height)		1 nV/vHz to 200 nV/vH:			1.6 %		
Linearity of the vertical axis  0 % FSH to 100 % FSH  Ultrasonic Phased Array Testing Devices  0 % FSH to 100 % FSH  DIN EN ISO 18563-1:2022 group 2		1 dB to 110 dB			235·10 <sup>-6</sup> dB		
Testing Devices group 2		0 % FSH to 100 % FSH			23.84·10 <sup>-6</sup> % FSH	FSH: Full screen height (total screen height)	
	Testing Devices		ting Devices				
Rise time/pulse width 2.5 ns to 5000 ns 0.23 ns		2.5 ns to 5000 ns			0.23 ns		
Voltage 10 V to 450 V 0.1 %							
Linearity of the Delay 0 µs to 80 µs 0.2 ns							
Receiver		- σ μο το σο μο		1	0.2113		
Frequency dependence 0.1 MHz to 30 MHz 0.2 kHz	Frequency dependence	0.1 MHz to 30 MHz	requency dependence		0.2 kHz		
Equivalent input noise   1 nV/vHz to 200 nV/vHz   1.6 %	Equivalent input noise		Equivalent input noise				
Linearity of the amplification 1 dB to 110 dB 235·10 <sup>-6</sup> dB	Linearity of the	1 dB to 110 dB	inearity of the		235·10 <sup>-6</sup> dB		
Channel Gain Variation < 3 dB 3·10 <sup>-3</sup> dB		< 3 dB			3·10 <sup>-3</sup> dB		
Linearity of the vertical 0 % FSH to 100 % FSH 23.84·10 <sup>-6</sup> % FSH height (total		0 % FSH to 100 % FSH			23.84·10 <sup>-6</sup> % FSH	FSH: Full screen height (total screen height)	
Linearity of the Delay 0 $\mu s$ to 80 $\mu s$ 2.88·10 <sup>-3</sup> $\mu s$	Linearity of the Delay	0 μs to 80 μs	inearity of the Delay		2.88·10 <sup>-3</sup> μs		

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#### Annex to the Accreditation Certificate D-K-15178-03-00

#### **On-site calibration**

Kalibrier- und Messmöglichkeiten (CMC)

	Nan	DIIG	er- und mes	smognenkerten (Ci	VIC)	
Messgröße / Kalibriergegenstand	Messbere	ich /	Messspanne	Messbedingungen / Verfahren	Erweiterte Messunsicherheit	Bemerkungen
Ultrasonic Testing Devices				DIN EN ISO 22232-1:2021		
Transmitter				group 2		
Rise time/pulse width	2.5 ns	to	5000 ns		0.23 ns	
Voltage	10 V	to	450 V		0.1 %	
Receiver						
Frequency dependence	0.1 MHz	to	30 MHz		0.2 kHz	
Equivalent input noise level	1 nV/√Hz	to	200 nV/√Hz		1.6 %	
Linearity of the amplification	1 dB	to	110 dB		235·10 <sup>-6</sup> dB	
Linearity of the vertical axis	0 % FSH	to	100 % FSH		23.84·10 <sup>-6</sup> % FSH	FSH: Full screen height (total screen height)
Ultrasonic Phased Array				DIN EN ISO 18563-1:2022		
Testing Devices				group 2		
Transmitter						
Rise time/pulse width	2.5 ns	to	5000 ns		0.23 ns	
Voltage	10 V	to	450 V		0.1 %	
Linearity of the Delay	0 μs	to	80 μs		0.2 ns	
Receiver						
Frequency dependence	0.1 MHz	to	30 MHz		0.2 kHz	
Equivalent input noise level	1 nV/vHz	to	200 nV/vHz		1.6 %	
Linearity of the amplification	1 dB	to	110 dB		235·10 <sup>-6</sup> dB	
Channel Gain Variation	< 3 dB				3⋅10 <sup>-3</sup> dB	
Linearity of the vertical axis	0 % FSH	to	100 % FSH		23.84·10 <sup>-6</sup> % FSH	FSH: Full screen height (total screen height)
Linearity of the Delay	0 μs	to	80 μs		2.88·10 <sup>-3</sup> μs	

#### **Abbreviations used:**

DIN Deutsches Institut für Normung e.V. – German institute for standardization

EN Europäische Norm – European Standard

IEC International Electrotechnical Commission

ISO International Organization for Standardisation

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