Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15211-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from:	**04.04.2023**	**Valid to:**	**03.04.2028**
Date of issue:	12.09.2024		

Holder of accreditation certificate:

Empresa Nacional de Aeronáutica de Chile (ENAER)
Laboratorio Custodio de los Patrones Nacionales Magnitud Presión y Humedad
Gran Av. Jose Miguel Carrera 11087, El Bosque, 8010744 Santiago de Chile

with the location

Empresa Nacional de Aeronáutica de Chile (ENAER)
Laboratorio Custodio de los Patrones Nacionales Magnitud Presión y Humedad
Gran Av. Jose Miguel Carrera 11087, El Bosque, 8010744 Santiago de Chile

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:

Mechanical quantities

- **Pressure**

Thermodynamic quantities

Humidity quantities

- **Devices for relative humidity**

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.

Within the measurands/calibration items marked with *, 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.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Pressure				
Absolute pressure p_{abs}*	0.015 bar to 0.08 bar	DKD-R 6-1:2014 EURAMET Calibration Guide No. 17 Version 4.0	$2.5 \cdot 10^{-5} \cdot p_{abs} + 3.5$ µbar	Pressure medium: gas p_{abs} = measured absolute pressure in bar The uncertainty of the measured residual pressure has to be added.
	> 0.08 bar to 7.0 bar		$2.0 \cdot 10^{-5} \cdot p_{abs} + 4.0$ µbar	
	> 7.0 bar to 35 bar		$2.5 \cdot 10^{-5} \cdot p_{abs} + 12$ µbar	
	> 35 bar to 70 bar		$2.5 \cdot 10^{-5} \cdot p_{abs} + 25$ µbar	
Absolute pressure p_{abs}*	1.5 bar to 51 bar	DKD-R 6-1:2014 EURAMET Calibration Guide No. 17 Version 4.0 Principle of measurement: $p_{abs} = p_e + p_{amb}$	$3.0 \cdot 10^{-5} \cdot p_{abs} + 500$ µbar	Pressure medium: oil p_{abs} = measured absolute pressure in bar The uncertainty of the measured atmospheric pressure has to be added.
	> 51 bar to 501 bar		$3.0 \cdot 10^{-5} \cdot p_{abs} + 0.23$ mbar	
	> 501 bar to 1001 bar		$4.5 \cdot 10^{-5} \cdot p_{abs} + 0.47$ mbar	
	> 1001 bar to 1401 bar		$5.0 \cdot 10^{-5} \cdot p_{abs} + 0.33$ mbar	
	> 1401 bar to 2501 bar		$2.0 \cdot 10^{-4} \cdot p_{abs} + 10$ mbar	
Gauge pressure p_e*	–1.0 bar to –0.03 bar	DKD-R 6-1:2014 EURAMET cg-3 Version 1.0 EURAMET Calibration Guide No. 17 Version 4.0	$6.0 \cdot 10^{-5} \cdot \lvert p_e \rvert + 17$ µbar	Pressure medium: gas p_e = measured gauge pressure in bar
	–0.01 bar to 0.030 bar		$2.5 \cdot 10^{-4} \cdot \lvert p_e \rvert + 3.5$ µbar	
	> 0.030 bar to 0.08 bar		$2.0 \cdot 10^{-5} \cdot p_e + 3.5$ µbar	
	> 0.08 bar to 7.0 bar		$1.5 \cdot 10^{-5} \cdot p_e + 4.0$ µbar	
	> 7.0 bar to 35 bar		$2.2 \cdot 10^{-5} \cdot p_e + 12$ µbar	
	> 35 bar to 70 bar		$2.2 \cdot 10^{-5} \cdot p_e + 25$ µbar	
Gauge pressure p_e*	0.5 bar to 50 bar	DKD-R 6-1:2014 EURAMET cg-3 Version 1.0 EURAMET Calibration Guide No. 17 Version 4.0	$3.0 \cdot 10^{-5} \cdot p_e + 500$ µbar	Pressure medium: oil p_e = measured gauge pressure in bar
	> 50 bar to 500 bar		$3.0 \cdot 10^{-5} \cdot p_e + 0.23$ mbar	
	> 500 bar to 1000 bar		$4.5 \cdot 10^{-5} \cdot p_e + 0.47$ mbar	
	> 1000 bar to 1400 bar		$5.0 \cdot 10^{-5} \cdot p_e + 0.33$ mbar	
	> 1400 bar to 2500 bar		$2.0 \cdot 10^{-4} \cdot p_e + 10$ mbar	

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Humidity Relative humidity	10 % to 85 %	LCPN-HR-101, Rev. C:2017 Climate cabinet Air temperature: 10 °C to 70 °C Dew point temperature: −5 °C to 60 °C	1.0 %	Uncertainty is an absolute value of relative humidity.
	> 85 % to 90 %		1.3 %	
	10 % to 40 %	LCPN-HR-201, Rev. C:2017 Humidity generator Air temperature: 5 °C to 70 °C	0.5 %	Uncertainty is an absolute value of relative humidity.
	> 40 % to 60 %		0.6 %	
	> 60 % to 95 %		0.8 %	
Air temperature	5 °C to 70 °C	LCPN-HR-201, Rev. C:2017 Humidity generator	0.3 K	Comparison with temperature sensor of humidity generator or dew point meter
	10 °C to 70 °C	LCPN-HR-101, Rev. C:2017 Climate cabinet	0.5 K	Comparison with relative humidity and air temperature sensors

Abbreviations used:

CMC	Calibration and measurement capabilities
DIN	Deutsches Institut für Normung e.V. – German institute for standardization
EN	Europäische Norm – European Standard
EURAMET	European Association of National Metrology Institutes
IEC	International Electrotechnical Commission
ISO	International Organization for Standardisation
LCPN-HR	Calibration procedure of Empresa Nacional de Aeronáutica de Chile