SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: January 31, 2022 Certificate Number: 4798.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 7]:

I. Acoustical Quantities[4]

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Sound Level – Measure[3]	(35 to 100) dB (Low Range) (65 to 130) dB (High Range)	0.41 dB 0.26 dB	Cirrus research sound level meter CR151
Sound Level – Measuring Equipment[3]	94 dB (1 kHz) 114 dB (1 kHz)	0.69 dB 0.62 dB	Extech sound level calibrator 407766

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II. Chemical Quantities[4]

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
pH – Measuring Equipment[3]	4 pH 7 pH 10 pH	0.012 pH 0.012 pH 0.012 pH	pH calibration buffer solutions
Sodium (Na) Concentration – Measure[3]	10 ppm in 2 % NHO3 100 ppm in 2 % NHO3 500 ppm in 2 % NHO3 1000 ppm in 2 % NHO3	0.15 µg/ml 1 µg/ml 5 µg/ml 10 µg/ml	Using accredited solutions
Electrolytic Conductivity – Measuring Equipment[3]	1 µS ± 10 % µS 5 µS ± 10 % µS 10 µS ± 10 % µS 100 µS ± 10 % µS 1000 µS ± 10 % µS 1413 µS ± 10 % µS 10 000 µS ± 10 % µS 150 000 µS ± 10 % µS 200 000 µS ± 10 % µS	0.32 µS 0.57 µS 0.56 µS 2.2 µS 4.8 µS 5.3 µS 44 µS 550 µS 740 µS	Conductivity solutions
Turbidity – Measure[3]	1 NTU 2 NTU 3 NTU 5 NTU 10 NTU 50 NTU 100 NTU 500 NTU 1000 NTU	0.13 NTU 0.12 NTU 0.12 NTU 0.12 NTU 0.15 NTU 1.5 NTU 2.0 NTU 3.1 NTU 17 NTU	Accredited solutions

III. Fluid[4]

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
POVA (Piston/Plunger Operated Volumetric Apparatus) – Fixed and Variable Pipettes	(0.1 to 10) µL (10 to 100) µL (100 to 1000) µL (>1 to 10) mL	0.032 µL 0.033 µL 9.7 µL 12 µL	Gravimetric forward method ISO 8655-6 RADWAG MYA.21.4Y P.B. precision scale Adam ABL 125 precision scale
Gas Concentration – Measure[3]			
O_2	5.00 % 10.00 % 20.90 %	0.16 % Concentration 0.16 % Concentration 0.16 % Concentration	Apogee MO-200 with probe
CO_2	5.00 % 10.00 % 20.00 %	0.37 % Concentration 0.66 % Concentration 1.2 % Concentration	GMP70 with GMP251 probe
Gas Detection – Measuring Equipment[3]			
O_2	5 % 10 % 20.90 %	2.0 % Concentration 2.0 % Concentration 2.0 % Concentration	Standard gases
CO_2	5 % 10 % 20 %	2.0 % Concentration 2.1 % Concentration- 2.3 % Concentration	

IV. Mechanical[4]

Parameter/Equipment	Range	CMC[2] (±)	Comments
Rotational Speed[3]	(6 to < 8300) rpm (8300 to < 25 000) rpm (25 000 to 99 999) rpm	1.5 rpm 2.5 rpm 8.1 rpm	Digital tachometer
Balances and Scales[3]			
In 1-2-5 steps	(1 to 200) mg	0.31 mg	ASTM class E2 and class 1 weights
Fixed Points	500 mg 1 g 2 g 3 g 5 g	0.42 mg 3.0 mg 4.0 mg 4.0 mg 5.0 mg	
	10 g 50 g 100 g 200 g	7.8 mg 11 mg 17 mg 30 mg	
	300 g 500 g 1 kg 2 kg 5 kg	42 mg 89 mg 0.16 g 0.47 g 0.21 g	
	10 kg 50 kg 100 kg 200 kg 300 kg 400 kg 500 kg 600 kg	0.73 g 3.8 g 5.1 g 14 g 19 g 23 g 32 g 37 g	Troemner NVLAP 105013-0 class F weights
Centrifuge[3] –	(6 to <8300) rpm (8300 to <25 000) rpm	1.5 rpm 2.5 rpm	Digital tachometer
Rotational Speed	(25 000 to 99 999) rpm	8.1 rpm	
Temperature	(0 to <100) (100 to <420) (420 to 650)	0.036 °C 0.068 °C 0.077 °C	Digital thermometer

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Centrifuge (cont)[3] –			
Timer	(1 to 7200) s	0.68 s	Stopwatch
Vibration	(0.0 to 4.8) mm/s (4.8 to 20) mm/s	0.24 mm/s 1.0 mm/s	Vibration meter
Pressure and Vacuum – Measure[3]	(-5 to -25) psi (-34.37 to -172.37) kPa (-25 to -45) psi (-172.36 to -310.26) kPa (-45 to -85) psi (-310.26 to -568.05) kPa (-85 to -91) psi (58.05 to -627.423) kPa	0.18 psi 1.2 kPa 0.15 psi 1.0 kPa 0.12 psi 0.83 kPa 0.13 psi 0.90 kPa	Ametek/Jofra APC 500
	Up to 700 kPa Up to 101.56 psi (700 to 1400) kPa (101.5 to 203.05) psi (1400 to 2100) kPa (203.05 to 304.58) psi	0.76 kPa 0.1 psi 1.0 kPa 0.14 psi 1.2 kPa 0.17 psi	Digital pressure gage: 300 PSI/2068 kPa crystal gage
	(2068 to 4836) kPa (299.94 to 701.40) psi (4836 to 10 342) kPa (701.40 to 1499.98) psi (10 342 to 13 790) kPa (1499.98 to 2000.07) psi (13 790 to 20 684) kPa (2000.07 to 2999.96) psi	2.0 kPa 0.29 psi 2.3 kPa 0.33 psi 2.7 kPa 0.39 psi 3.2 kPa 0.46 psi	3K PSI/20684 kPa crystal gage
Pressure – Measuring Instruments[3]	Up to 700 kPa Up to 101.56 psi (700 to 1400) kPa (101.5 to 203.05) psi (1400 to 2100) kPa (203.05 to 304.58) psi	0.76 kPa 0.1 psi 1.0 kPa 0.14 psi 1.2 kPa 0.17 psi	Pressure source monitored with: 300 PSI/2068 kPa crystal gage
	(2068 to 4836) kPa (299.94 to 701.40) psi (4836 to 10 342) kPa (701.40 to 1499.98) psi (10 342 to 13 790) kPa (1499.98 to 2000.07) psi (13 790 to 20 684) kPa (2000.07 to 2999.96) psi	2.0 kPa 0.29 psi 2.3 kPa 0.33 psi 2.7 kPa 0.39 psi 3.2 kPa 0.46 psi	3K PSI/20684 kPa crystal gage

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Differential Pressure – Measuring Equipment[3]	(0.1 to 0.9) in/H_2O (1.0 to 9.0) in/H_2O (10 to 90) in/H_2O (100 to 140) in/H_2O	0.090 in/H_2O 0.090 in/H_2O 0.094 in/H_2O 0.093 in/H_2O	ASC-400 with Additel 681 gauges
Differential Pressure – Measure[3]	 (0 to 2.0) psi (0 to 55.42) in/H_2O (0 to 2.0) psi (0 to 166.25) in/H_2O (2.00 to 6.0) psi (0 to 166.25) in/H_2O (6.0 to 28.0) psi (166.25 to 775.81) in/H_2O	 0.0061 psi 0.17 in/H_2O 0.0070 psi 0.19 in/H_2O 0.0061 psi 0.17 in/H_2O 0.018 psi 0.50 in/H_2O	Extech 407910 with AMP30PSI ref and Reed 3002 Extech HD700 Extech HD700 Extech 407910
Barometric Pressure – Measuring Equipment[3]	(500 to 899) mbar (900 to 1100) mbar	0.11 mbar 0.12 mbar	Pressure Calibrator ASC-400 with APM30

V. Thermodynamics[4]

Parameter/Equipment	Range	CMC[2, 6] (±)	Comments
Temperature – Measure[3, 5]	(-90 to 100) °C (100 to 420) °C (420 to 650) °C	0.036 °C 0.068 °C 0.077 °C	Digital thermometer with PRT
Temperature – Measuring Equipment[3]	(-90 to 100) °C (100 to 420) °C (420 to 650) °C	0.036 °C 0.068 °C 0.077 °C	Dry well with PRT
Relative Humidity – Measuring Equipment[3]	(20 to 35) % RH (35 to 50) % RH (50 to 65) % RH (65 to 80) % RH (80 to 95) % RH	0.84 % RH 0.79 % RH 1.2 % RH 1.2 % RH 1.3 % RH	VAISALA MI70 meter and rotronic humidity standards

VII. Time and Frequency[4]

Parameter/Equipment	Range	CMC[2] (±)	Comments
Timing Devices[3]	(1 to 7200) s	0.68 s	Stopwatch

[1] This laboratory offers commercial calibration service and field calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

[4] Calibration of nominal values intermediate to those shown on the Scope of Accreditation, nominal values with units of measure derived from SI units, and nominal values converted from SI units, are permissible and may have CMCs larger than the linear interpolation of a CMC displayed on this Scope of Accreditation.

[5] The contributions from the "best existing device" are not included in the CMC claim.

[6] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[7] This scope meets A2LA's *P112 Flexible Scope Policy*.

Accredited Laboratory

A2LA has accredited

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for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories.* This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 3rd day of March 2020.

[redacted]

5.1.2e

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4798.01
Valid to January 31, 2022

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.