Accredited Laboratory

A2LA has accredited

ANALYTICAL LABORATORY EIRL

Lima, PERU

for technical competence in and compliance with the

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 the 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 1st day of August 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 6032.01
Valid to December 31, 2024

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: December 31, 2024 Certificate Number: 6032.01

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

I. Acoustics

Parameter/Range	Frequency	CMC[2, 5] (±)	Comments
Sound Level Meters – Class I & Class II			INACAL PC-023 procedure for calibration of sound level meters. First edition - January 2017.
Acoustic Calibration (94, 114) dB	1000 Hz	0.21 dB	
Electric Calibration (10 to 150) dB	(20 to 20 000) Hz	0.27 dB	

II. Chemical

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Gas Analyzers – (Concentration)			ALAB MVAL-LAB-1: calibration of gas analyzer in air quality. Rev. 00: 2020 by Dynamic Dilution.
CO in N_2	$(0.13 \times 10^{-6}$ to $54 \times 10^{-6})$ mol/mol	0.024×10^{-6} mol/mol	
NO in N_2	$(0.250 \times 10^{-6}$ to $53 \times 10^{-6})$ mol/mol	0.74×10^{-9} mol/mol	

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
Gas Analyzers – (cont) SO_2 in N_2 NO_2 in Air/N_2 H_2S in N_2	 (100 x 10^{-9} to 54 x 10^{-6}) mol/mol (100 x 10^{-9} to 2.4 x 10^{-6}) mol/mol (15 x 10^{-9} to 0.5 x 10^{-6}) mol/mol	 0.77 x 10^{-9} mol/mol 1.7 x 10^{-9} mol/mol 1.7 x 10^{-9} mol/mol	ALAB MVAL-LAB-1: calibration of gas analyzer in air quality. Rev. 00: 2020 by Dynamic Dilution
Combustion Gas Analyzers – (Concentrations) CH_4 in N_2 CO in Air/N_2 NO in Air/N_2 SO_2 in Air/N_2 NO_2 in Air/N_2 O_2 in Air/N_2 H_2S in Air/N_2	 0.025 mol/mol 1015 x 10^{-6} mol/mol 508 x 10^{-6} mol/mol 50.5 x 10^{-6} mol/mol 984.8 x 10^{-6} mol/mol 45.1 x 10^{-6} mol/mol 1000 x 10^{-6} mol/mol 45.7 x 10^{-6} mol/mol 44 x 10^{-6} mol/mol 0.18 mol/mol 10.5 x 10^{-6} mol/mol	 0.025 % 8.1 x 10^{-6} mol/mol 7.9 x 10^{-6} mol/mol 0.59 x 10^{-6} mol/mol 7.1 x 10^{-6} mol/mol 0.82 x 10^{-6} mol/mol 10 x 10^{-6} mol/mol 0.61 x 10^{-6} mol/mol 0.82 x 10^{-6} mol/mol 0.16 % 0.094 x 10^{-6} mol/mol	ALAB MVAL-LAB-4: calibration procedure of emission gas analyzer. Rev. 00: 2020 by direct comparison
Conductivity Meters[3]	1 µS/cm 5 µS/cm 10 µS/cm 100 µS/cm 1000 µS/cm 1413 µS/cm 10 000 µS/cm	0.62 µS/cm 0.62 µS/cm 0.62 µS/cm 2.1 µS/cm 4.8 µS/cm 6.2 µS/cm 40 µS/cm	INDECOPI PC-022 procedure for the calibration of conductometers. First edition 2014.
pH Meters[3]	4 pH 7 pH 10 pH	0.012 pH 0.012 pH 0.012 pH	INACAL PC-020 procedure for the calibration of pH meters. Second edition 2017.

III. Dimensional

Parameter/Equipment	Range	CMC[2, 5, 8] (±)	Comments
Ruler	Up to 1000 mm	0.17 µm	MVAL-LAB-9 Class II ruler calibration procedure
EC Class II & III Tape Measures	Up to 1 m Up to 2 m Up to 3 m Up to 5 m	0.26 mm 0.27 mm 0.59 mm 0.71 mm	MVAL-LAB-10 Class II & III tape measure calibration procedure
Outside Micrometers	Up to 10 mm Up to 25 mm Up to 150 mm (150 to 300) mm (300 to 400) mm	1.3 µm 1.3 µm 1.7 µm 1.7 µm 1.7 µm	MVAL-LAB-11 outside micrometer calibration procedure
Vernier Caliper	Up to 150 mm Up to 200 mm Up to 300 mm Up to 450 mm Up to 500 mm Up to 600 mm Up to 800 mm	$\sqrt{5.8^2 + 0.015^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0016^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0061^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0010^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0010^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0068^2 x L^2}$ µm $\sqrt{5.8^2 + 0.0068^2 x L^2}$ µm	INDECOPI SNM PC-012 procedure of calibration for Pie de Rey. 5th Edition: 2012

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 5, 7] (±)	Comments
DC Voltage – Generate	(2000 to 4000) mV (4 to 950) V	2.3 mV 0.59 V	INACAL PC-021 procedure for the calibration of digital multimeters edition 2: 2016.

Parameter/Equipment	Range	CMC[2, 5, 7] (±)	Comments
DC Current – Generate	(20 to 40) µA (40 to 200) µA (200 to 400) µA (400 to 2000) µA (2 to 4) mA (4 to 20) mA (20 to 40) mA (0.18 to 0.9) A (0.9 to 2.25) A (2.5 to 4.5) A (4.5 to 9) A (9 to 18) A	0.046 µA 0.23 µA 0.46 µA 2.3 µA 0.52 mA 0.75 mA 0.047 mA 0.057 A 0.058 A 0.058 A 0.059 A 0.062 A	INACAL PC-021 procedure for the calibration of digital multimeters edition 2: 2016.
Resistance – Generate	(20.0 to 180) Ω (0.2 to 1.8) kΩ (2 to 18) kΩ	1.0 Ω 0.14 kΩ 0.17 kΩ	INACAL PC-021 procedure for the calibration of digital multimeters edition 2: 2016.
Insulation Resistance Generate –			
Megohmmeter	(1 to 10) kΩ (10 to 100) kΩ (100 to 1000) kΩ (1 to 10) MΩ (10 to 100) MΩ (100 to 1000) MΩ (1 to 10) GΩ (10 to 100) GΩ (100 to 1000) GΩ	0.044 kΩ 0.12 kΩ 1.2 kΩ 0.35 MΩ 1.2 MΩ 12 GΩ 0.64 GΩ 5.8 GΩ 58 GΩ	EL-004 megohmmeter calibration procedure
Tellurometer	(20.0 to 180) Ω (0.2 to 1.8) kΩ (2 to 18) kΩ (20 to 180) kΩ (100 to 1000) kΩ	0.89 Ω 0.14 kΩ 0.16 kΩ 0.89 kΩ 1.2 kΩ	ALAB MVAL-LAB-17 calibration procedure for tellurometer, rev. 00:2021.

Parameter/Range	Frequency	CMC[2, 5, 7] (±)	Comments
AC Voltage – Generate (20 to 100) V (100 to 200) V (200 to 500) V (500 to 950) V	60 Hz	0.3 V 0.31 V 0.40 V 0.62 V	INACAL PC-021 procedure for the calibration of digital multimeters edition 2: 2016.
AC Current – Generate (2 to 4) mA (4 to 20) mA (20 to 40) mA (40 to 200) mA	60 Hz	0.024 mA 0.11 mA 0.23 mA 1.1 mA	INACAL PC-021 procedure for the calibration of digital multimeters edition 2: 2016.

V. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Volume – Burette	Up to 1 mL Up to 2 mL Up to 5 mL Up to 10 mL (d= 0.02 mL) Up to 10 mL (d= 0.05 mL) Up to 25 mL Up to 50 mL	0.0013 mL 0.0019 mL 0.0020 mL 0.0023 mL 0.0028 mL 0.0048 mL 0.0070 mL	INACAL PC-015 calibration procedure for volumetric glass & plastic material. 5th edition 2017. Note: intermediate volumes will take the immediate higher uncertainty.
One & Two Stroke Pipettes	1 mL 2 mL 5 mL 10 mL 20 mL 25 mL 50 mL 100 mL	0.0011 mL 0.0018 mL 0.0028 mL 0.0022 mL 0.0027 mL 0.0031 mL 0.0058 mL 0.0098 mL	

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Volume – (cont)			
One-Mark Flasks	1 mL 2 mL 5 mL 10 mL 20 mL 25 mL 50 mL 100 mL 200 mL 250 mL 500 mL 1000 mL 2000 mL	0.0039 mL 0.0044 mL 0.0050 mL 0.0049 mL 0.0052 mL 0.0053 mL 0.0076 mL 0.0097 mL 0.020 mL 0.020 mL 0.034 mL 0.060 mL 0.13 mL	INACAL PC-015 calibration procedure for volumetric glass & plastic material. 5th edition 2017. Note: intermediate volumes will take the immediate higher uncertainty
Graduated Pipette	Up to 0.1 mL Up to 2 mL Up to 5 mL Up to 10 mL Up to 20 mL Up to 25 mL	0.0012 mL 0.0021 mL 0.0031 mL 0.0046 mL 0.011 mL 0.016 mL	
Pycnometers	10 mL 25 mL 50 mL 100 mL	0.0009 mL 0.0020 mL 0.0030 mL 0.0058 mL	
Graduated Measuring Cylinders	Up to 5 mL Up to 10 mL Up to 25 mL Up to 50 mL Up to 100 mL Up to 250 mL Up to 500 mL Up to 1000 mL Up to 2000 mL	0.020 mL 0.021 mL 0.023 mL 0.098 mL 0.090 mL 0.016 mL 0.30 mL 0.74 mL 0.82 mL	
Imhoff Cone	Up to 100 mL (100 to 1000) mL	$(0.0093X + 0.17)$ mL $(0.0014X + 0.94)$ mL	X = nominal volume (mL)

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Volume – (cont)			
Piston Micropipettes	1 µL Up to 2.5 µL Up to 10 µL Up to 20 µL Up to 100 µL Up to 200 µL Up to 1000 µL Up to 5000 µL Up to 10 000 µL	0.052 µL 0.073 µL 0.085 µL 0.046 µL 0.34 µL 0.29 µL 1.6 µL 6.6 µL 15 µL	INACAL PC-027 procedure for the calibration of piston pipettes. 1st edition 2019. Note: intermediate volumes will take the immediate higher uncertainty
Piston Apparatus (Piston Burettes & Dispensers)	Up to 1 mL (> 1 to 2) mL (> 2 to 5) mL (> 5 to 10) mL (> 10 to 25) mL (> 25 to 50) mL	0.000 22 mL 0.000 44 mL 0.0011 mL 0.0058 mL 0.0059 mL 0.011 mL	ALAB MVAL-LAB-19 procedure for the calibration of piston-actuated volumetric instruments, Rev. 00:2021.
Metallic Volumetric Meters	5 gal	0.03 % of the nominal value	ALAB MVAL-LAB-3 calibration procedure for metallic volumetric meters (volumetric method) Rev. 00: 2020 (based on the Peruvian metrological standard NMP 009: 1999 "measurement systems for liquids other than water: standard volumetric meters")
Flow Rate[3] – Air Flowmeters	(0.05 to 1) L/min (1 to 10) L/min (10 to 30) L/min	0.012 L/min 0.016 L/min 0.14 L/min	CEM ME-009 procedure for the calibration of gas flow meters. Digital edition 1. Reference flow conditions: 1 atm (101325 Pa) and temperature of 298.15 K.

VI. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Balances[3] –			
Balance Class I	(0 to 1100) g	$(5.4 \times 10^{-6} X + 4.7 \times 10^{-6})$ g	INDECOPI PC-011 calibration procedure for non-automatic Class I & II balances. Fourth edition 2010.
Balance Class II	(0 to 8200) g	$(4.4 \times 10^{-6} X + 1.1 \times 10^{-2})$ g	
Balance Class III & IIII	(0 to 150) kg	$(1.2 \times 10^{-1} X + 1.3 \times 10^{-1})$ g	X: balance indication in g
Mass –			
OIML Classes M2	100 mg 200 mg 500 mg	0.095 mg 0.15 mg 0.15 mg	INACAL PC-008 procedure for the calibration of weights of accuracy class OIML M1-2, M2, M2-3 & M3 (NMP 004:2007). First Edition-April 2021
OIML Classes M2 & M3	1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg	0.29 mg 0.78 mg 0.78 mg 0.80 mg 0.80 mg 0.80 mg 0.83 mg 1.1 mg 3.3 mg 68 mg 50 mg 50 mg 0.43 g 0.55 g	
Pressure –			
Barometers, & Meteorological Stations	(800 to 1100) mbar	0.52 mbar	INACAL PC-024 calibration of measurement instruments, absolute pressure. First edition 2018.

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Pressure – (cont) Liquid Column Manometer	(0.0 to 55) inH_2O	0.33 inH_2O	CEM-Spain ME-021 procedure for the calibration of liquid column (manometric & barometric). Digital edition 2, 2020.
Pressure Gauges, Vacuum Gauges, & Pressure/Vacuum Gauges[3]	(-0.9 to 0) bar (0 to 700) bar	0.18 bar 0.85 bar	CEM-Spain ME-003 procedure for the calibration of pressure gauges, vacuum gauges & pressure/vacuum gauges, 3 ed.
Air Velocity – Anemometers	(0.5 to 5) m/s (5 to 10) m/s 10 to 15) m/s (15 to 20) m/s (20 to 25) m/s	0.46 m/s 0.68 m/s 0.9 m/s 1.1 m/s 1.3 m/s	ALAB MVAL-LAB-6 procedure for anemometer calibration.

VII. Optical Quantities

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Spectrophotometers[3] – Wavelength Absorbance	 279.35 nm 360.85 nm 453.60 nm 536.45 nm 637.65 nm 440 nm: 0.2662 A 0.5284 A 1.0809 A	 0.21 nm 0.21 nm 0.21 nm 0.21 nm 0.21 nm 0.0025 A 0.0029 A 0.0068 A	 ALAB MVAL-LAB-18 procedure for the calibration of spectrophotometer UV-Vis. rev. 00:2021.

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Spectrophotometers[3] – (cont) Absorbance	465 nm: 0.2410 A 0.4859 A 1.0013 A 546.1 nm: 0.2524 A 0.5005 A 1.0141 A 590 nm: 0.2880 A 0.5579 A 1.0855 A 635 nm: 0.2918 A 0.5547 A 1.0511 A	 0.0025 A 0.0029 A 0.0068 A 0.0025 A 0.0029 A 0.0035 A 0.0025 A 0.0035 A 0.0069 A 0.0025 A 0.0035 A 0.0069 A	ALAB MVAL-LAB-18 procedure for the calibration of spectrophotometer UV-Vis. rev. 00:2021.

VIII. Thermodynamics

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Thermostatic Baths (Alcohol, Water or Oil as Thermostatic Medium)[3]	(-60 to 200) °C	0.051 °C	INDECOPI/SNM PC-019 procedure for the calibration of thermostatic baths. First edition 2019.
Temperature[3] – Incubators, Stoves, Ovens, Environmental Chambers, Refrigerators, Freezers & Similar Equipment	(-60 to 250) °C (200 to 1000) °C	0.037 °C 0.17 °C	INDECOPI/SNM PC-018 procedure for the calibration or characterization of isothermal media with air as a thermostatic medium. Second edition 2009.

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Temperature[3] – Heating Plate	(150 to 200) °C (200 to 300) °C (300 to 400) ºC	0.23 °C 1.2 °C 6.7 °C	ALAB MVAL-LAB-15 procedure for the calibration temperature plate.
Temperature[3] – Digester	(0 to 100) °C (100 to 250) °C	0.19 °C 0.22 °C	ALAB MVAL-LAB-16 digester calibration procedure.
Temperature[3] – Autoclave	(100 to 180) °C	0.2 °C	INDECOPI PC-006 procedure for the calibration of autoclaves. Second edition 2008.
Thermometers – Analog Digital	 (-60 to 250) °C (-60 to 250) °C (200 to 1000) °C	 0.12 °C 0.058 °C 3.9 °C	MVAL-LAB-5 procedure for the calibration of analog thermometer INDECOPI PC-017 procedure for calibration of digital thermometers. Second edition 2012.
IR Thermometers	(50 to 100) °C (100 to 200) °C (200 to 320) °C	3.1 °C 3.8 °C 5.2 °C	CEM-Spain Procedure TH-002 for the calibration of infrared radiation thermometers. Digital edition 1.
Thermo-Hygrometer – Temperature Function – Sensor Probe	 (-30 to 200) °C	 0.12 °C	INDECOPI PC-017 procedure for calibration of digital thermometers. Second edition 2012.
Hygrometers & Environmental Thermometers – Temperature Function Sensor In Humidity Function	 (10 to 40) °C (20 to 90) % RH	 0.48 °C 2.2 % RH	INACAL PC-026 procedure for the calibration of hygrometers & environmental thermometers. First edition 2019.

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Liquid-In-Glass Thermometers (Partial, Total & Complete Immersion)	(-60 to 20) °C (20 to 90) °C (80 to 250) °C	0.06 °C 0.07 °C 0.08 °C	Procedure TH-004 for calibration by comparison of liquid column thermometers

IX. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Chronometers	1 s to 10 min > 10 min to 3 h (> 3 to 9) h	0.062 s 0.062 s 0.073 s	MVAL-LAB-7 procedure for calibrating time counters
Non-Contact Tachometers	(10 to 50) rpm (50 to 100) rpm (100 to 500) rpm (500 to 1000) rpm (1000 to 5000) rpm (5000 to 10 000) rpm (10 000 to 50 000) rpm (50 000 to 99 000) rpm	0.013 rpm 0.061 rpm 0.13 rpm 0.61 rpm 1.1 rpm 1.9 rpm 6.3 rpm 12 rpm	MVAL-LAB-8 calibration procedure for tachometer witch optical sensor

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

[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 Generate. 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. 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] CMCs for intermediate values are calculated using linear interpolation.

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

[6] In the statement of CMC, percentages are percentages of reading, unless otherwise indicated.

[7] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

[8] In the statement of CMC, L is the numerical value of the nominal length of the device measured in millimeters.