



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELICROM CÍA. LTDA.
Cdla. Guayaquil, Mz 21 Calle Primera, Solar 10
Guayaquil, Ecuador 090506
Wimper Paladines Phone: 593 4 2282007

CHEMICAL

Valid To: August 31, 2025

Certificate Number: 4286.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following tests:

Chemical Measurements in the Field and the Lab: drinking water, natural water, wastewater, and treated wastewater

Test	In-house Method	Reference Method(s)
pH ¹	PEE.EL.021	Standard Methods 4500 H+B
Temperature ¹	PEE.EL.022	Standard Methods 2550B
Conductivity ¹	PEE.EL.023	Standard Methods 2510B; HACH 8160
Turbidity (Nephelometric Method) ¹	PEE.EL.024	Standard Methods 2130B
Dissolved Oxygen and Saturation Percentage ¹	PEE.EL.025	Standard Methods 4500-O G Ed.24 2022
Total Dissolved Solids (Electrometric Method) ¹	PEE.EL.029	HACH 8160
Salinity (Electrometric Method) ¹	PEE.EL.064	Standard Methods 2520 B
Determination of Free and Residual Chlorine ¹	PEE.EL.044	HACH 8021; HACH 10069; HACH 8167; HACH 10070; SM 4500-Cl G
Redox-ORP, Electrometric Method ¹	PEE.EL.048	Standard Methods 2580 (Aand B) Ed.24 2022 HACH10228
Floating Material ¹	PEE.EL.105	NMX-AA-006-SCFI-2010

Chemical Measurement: drinking water, natural water, wastewater, and treated wastewater

Test	In-house Method	Reference Method(s)
Chemical Oxygen Demand Closed Reflux (Colorimetric)	PEE.EL.026	Standard Methods 5220 D; HACH 8000
Total Suspended Solids	PEE.EL.027	Standard Methods 2540 D
Total Solids	PEE.EL.028	Standard Methods 2540 B
Fixed and Volatile Solids	PEE.EL.028	Standard Methods 2540 E Ed.24 2022 HACH 8276; EPA 1684
Total Volatile Solids	PEE.EL.028	Standard Methods 2540 E Ed.24 2022 HACH 8276; EPA 1684
Total Dissolved Solids	PEE.EL.029	Standard Methods 2540 C
Biochemical Oxygen Demand, Five-Day BOD Test	PEE.EL.030	Standard Methods 5210B; HACH 8043
Total Hardness	PEE.EL.031	Standard Methods 2340C; HACH 8226
Total Alkalinity	PEE.EL.032	Standard Methods 2320B; HACH 8203
Total Alkalinity (Phenolphthalein titration)	PEE.EL.032	Standard Methods 2320B; HACH 8203
Determination of Bicarbonates by Volumetric Method and Calculation	PEE.EL.032	Standard Methods 2320B; HACH 8203
Determination of Carbonates by Volumetric Method and Calculation	PEE.EL.032	Standard Methods 2320B; HACH 8203
True and Apparent Color	PEE.EL.033	Standard Methods 2120C; HACH 8025
Total Petroleum Hydrocarbons (TPHs) by GC FID	PEE.EL.034	EPA 8015 D; EPA 3510 C
Metals by AA Air-Acetylene Flame (Ca, Cd, Cr, Cu, Li, Mg, Ni, K, Fe, Na, Zn, Co) (Ag, Bi, Mn, Pd, Pt, Sb, Te)	PEE.EL.035	SM 3111B
Determination of Settleables Solids by Volumetric Method	PEE.EL.036	SM 2540 F
Hexavalent Chromium (Spectroscopic)	PEE.EL.037	Standard Methods 3500Cr B; HACH 8023
Sulfate (Turbidimetric)	PEE.EL.038	Standard Methods 4500 SO ₄ ²⁻ ; HACH 8051
Oil and Grease (Gravimetric Method)	PEE.EL.039	Standard Methods 5520 G; HACH 10300
Nitrogen (Nitrate), (Cadmium Reduction) Spectrophotometric Determination of Nitrogen (Nitrate and Nitrite)	PEE.EL.040	Standard Methods 4500 NO ₃ ⁻ E; HACH 8039

Test	In-house Method	Reference Method(s)
Spectrophotometric Determination of Cyanide	PEE.EL.041	SM 4500-CN- C and E; HACH 8027
Sulfite, Volumetric Method	PEE.EL.042	Standard Methods 4500-SO32-B Ed.24 2022; HACH 8071
Determination of Chloride (Volumetric)	PEE.EL.043	SM 4500 Cl-B; HACH 8225
Determination of Sodium Chloride (by Calculation)	PEE.EL.043	SM 4500 Cl-B; HACH 8225
Spectrophotometric Determination of Phosphorus Total	PEE.EL.045	SM 4500-P E; HACH 10209
Carbon Dioxide, Volumetric Method	PEE.EL.046	Standard Methods 4500-CO2 C, Ed.24 2022; HACH Method 8223
Density and Relative Density, Gravimetric	PEE.EL.047	Guía OIML G-14: Medición de Densidad Ed. 2011
Redox-ORP, Electrometric Method	PEE.EL.048	Standard Methods 2580 (A and B) Ed.24 2022; HACH10228
Chlorine Dioxide, Spectrophotometric Method	PEE.EL.066	Standard Methods 4500-CLO2 D, Ed.24 2022; HACH Method 10126
Sulfide, Spectrophotometric Method	PEE.EL.067	Standard Methods 4500-S ²⁻ H, Ed.24 2022; HACH Method 2537800 Model HS-C
Total Acidity to the Phenolphthalein, Volumetric Method	PEE.EL.068	Standard Methods 2310 B, Ed.24 2022; HACH Method 8010
Total Acidity to the Methyl Orange, Volumetric Method	PEE.EL.069	Standard Methods 2310 B, Ed.24 2022; HACH Method 8219

Test	In-house Method	Reference Method(s)
Organochlorine Pesticides, Gas Chromatographic Method-ECD Detector Total Organochlorine Pesticides Aldrin BHC (alpha isomer) BHC (beta isomer) BHC (delta isomer) 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin a-Endosulfan b-Endosulfan Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor epoxide (Isomer B) Lindane (BHC gamma isomer)	PEE.EL.081; IE.EL.119	EPA 3015 D; EPA 8081 B
Organophosphates Pesticides, Gas Chromatographic Method-MSD Detector Total Organophosphates Pesticides Dichlorvos Mocap Disulfoton Methyl Parathion Ronnell Dursban Tokuthion Guthion	PEE.EL.081; IE.EL.119	EPA 3015 D; EPA 8270 E
Ammonia Selective Electrode (ISE), Electrometric Method	PEE.EL.086	Standard Methods 4500-NH3 (D) Ed.24 2022; EPA 350.2/350.3
Spectrophotometric Determination of Fluoride	PEE.EL.091	SM 4500-F B and D; HACH 8029
Spectrophotometric Determination of Phenols	PEE.EL.049	SM 5530 C; HACH 8047
Spectrophotometric Determination of Total Organic Carbon (TOC)	PEE.EL.051	SM 5310 C; HACH 10129 – LR; HACH 10173 – MR; HACH 10128 – HR

Test	In-house Method	Reference Method(s)
Spectrophotometric Determination of Nitrogen (Nitrite), (Diazotization Method)	PEE.EL.052	Standard Methods 4500 NO ₂ ⁻ B; HACH 8507
Spectrophotometric Determination of Total Nitrogen	PEE.EL.090	SM 4500 N C; HACH 10072
Spectrophotometric Determination of Nitrogen (Ammonia)	PEE.EL.092	SM 4500-NH ₃ B; HACH 8038
Spectrophotometric Determination of Total Nitrogen TKN	PEE.EL.093	HACH 10242
Determination of Nitrogen (Organic) (by Calculation)	PEE.EL.092; PEE.EL.093	SM 4500-Norg A
Spectrophotometric Determination of Surfactants	PEE.EL.050	TNT 874
Sulfide (Methylene Blue Method)	PEE.EL.065	Standard Methods 4500 S ²⁻ D; HACH 8131
Hardness, Calcium	PEE.EL.072	Standard Methods 2340 C; HACH 8222
Magnesium Hardness by Calculation	PEE.EL.072	SM 2340 C
Boron, Spectrophotometric	PEE.EL.080	Standard Methods 4500-B C; HACH 8015
Metals by AA Electro-Thermal (As, Pb, Se, V) (Au, Al, Be, Ba, Mo, Sn, Sr, Ti, Tl, Ga, Ge, Yb, Rh, Er)	PEE.EL.071	Standard Methods 3113 B (Digestion: SM 3030 E/B/D); Ed.24 2022
Determination of Fecal Coliforms (MPN)	PEE.EL.096	SM 9221 E/9221 C
Determination of Total Coliforms (MPN)	PEE.EL.097	SM 9221 B/9221 C
Mould and yeast, Plate Count	PEE.EL.101	NTP 299/203
Mercury, Cold-Vapor Atomic Absorption Spectrometric Method	PEE.EL.102; PEE.EL.061	Standard Methods 3112 B Ed.24 2022; Digestion EPA 7470 A
Heterotrophic Plate Count, Pour Plate Method	PEE.EL.103	Standard Methods 9215 B Ed.24 2022
Orthophosphates, Spectrophotometric Method	PEE.EL.106	Standard Methods 4500-P-E Ed.24 2022; HACH 8048
Silica, Spectrophotometric Method	PEE.EL.107	Standard Methods 4500-SiO ₂ C Ed.24 2022; HACH 8185

Test	In-house Method	Reference Method(s)
Silicon, Spectrophotometric Method	PEE.EL.107	Standard Methods 4500-SiO ₂ C Ed.24 2022; HACH 8185
Standard Total Coliform, and E. Coli, Membrane Filter	PEE.EL.108	Standard Methods 9222 B, 9222 J Ed.24 2022; HACH 10029
Pseudomonas Aeruginosa, Membrane Filter Technique	PEE.EL.109	Standard Methods 9213 E Ed23 2017
Volatile Organic Compounds, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method Total Volatile Organic Compounds 1,1-dichloroethylene dichloromethane trans-1,2-dichloroethylene 1,1-dichloroethane 2,2-dichloropropane cis-1,2-dichloroethylene chloroform bromochloromethane 1,1,1-trichloroethane 1,1-dichloropropylene carbon tetrachloride 1,2-dichloroethane benzene trichloroethylene 1,2-dichloropropane bromodichloromethane dibromomethane trans 1,3-dichloropropene toluene cis 1,3-dichloropropene 1,1,2-trichloroethane 1,3-dichloropropane tetrachloroethylene dibromochloromethane 1,2-dibromoethane chlorobenzene 1,1,1,2-tetrachloroethane ethylbenzene m-xylene p-xylene o-xylene	PEE.EL.110	EPA 8260 C Purge and trap (EPA 5030 C)

Test	In-house Method	Reference Method(s)
Volatile Organic Compounds, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method (continued) Total Volatile Organic Compounds styrene cumene bromoform 1,1,2,2-tetrachloroethane 1,2,3-trichloropropane n-propylbenzene bromobenzene 1,2,4-trimethylbenzene 2-chlorotoluene 4-chlorotoluene tert-butylbenzene 1,3,5-trimethylbenzene sec-butylbenzene p-isopropyltoluene 1,4-dichlorobenzene 1,3-dichlorobenzene n-butylbenzene 1,2-dichlorobenzene 1,2-dibromo-3-chloropropane 1,2,3-trichlorobenzene hexachlorobutadiene naphthalene 1,2,4-trichlorobenzene	PEE.EL.110	EPA 8260 C Purge and trap (EPA 5030 C)
BTEX, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method Benzene Toluene Xylene Ethylbenzene	PEE.EL.110	EPA 8260 C; Purge and trap (EPA 5030 C) 5035A for soil
Determination of Fecal Coliforms (Filter Membrane)	PEE.EL.116	SM 9222D/B
Metals by ICP-Ms (Ag, As, Ba, Be, Cd, Cs, Co, Cr, Rb, U, V)	PEE.EL.125	EPA 3015 A; EPA 6020 B

Chemical Measurements: sediments, sludges, and soils

Test	In-house Method	Reference Method
pH, Electrometric Method	PEE.EL.021	SM 4500 H+B; EPA 9045 D; INEN 2325; INEN 1087

Test	In-house Method	Reference Method
Conductivity, Electrometric Method	PEE.EL.023	SM 2510B; EPA 9045 D
Total Petroleum Hydrocarbons (TPHs) by GC FID	PEE.EL.034	EPA 8015 D; EPA 3510 C
Metals by AA Air-Acetylene Flame (Ca, Cd, Cr, Cu, Li, Mg, Ni, K, Fe, Na, Zn, Co) (Ag, Bi, Mn, Pd, Pt, Sb, Te)	PEE.EL.035	Standard Methods 3113 B; EPA 3050 B
Hexavalent-Chromium, Spectrophotometric Method	PEE.EL.037	EPA 3060 A; EPA 7196 A
Oil and Grease (Gravimetric Method)	PEE.EL.039	EPA 9071B n-Hexane Extractable Material
Metals by AA Electro-Thermal (As, Pb, Se, V) (Au, Al, Be, Ba, Er, Ga, Ge, Mo, Ro, Sn, Sr, Ti, Tl, Yb)	PEE.EL.071	EPA 3050 B; Standard Methods 3113 B Ed.24 2022
Organochlorine Pesticides, Gas Chromatographic Method-ECD Detector Total Organochlorine Pesticides Aldrin BHC (alpha isomer) BHC (beta isomer) BHC (delta isomer) 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin a-Endosulfan b-Endosulfan Endosulfan sulfate Endrin Endrin aldehyde Heptachlor Heptachlor epoxide (Isomer B) Lindane (BHC gamma isomer)	PEE.EL.081; IE.EL.119	EPA 3550 C/EPA 3540 C; EPA 8081 B
Organophosphates Pesticides, Gas Chromatographic Method-MSD Detector Total Organophosphates Pesticides Dichlorvos Mocap Disulfoton Methyl Parathion Ronnell Dursban	PEE.EL.081; IE.EL.119	EPA 3015 D; EPA 8270 E

Test	In-house Method	Reference Method
Organophosphates Pesticides, Gas Chromatographic Method-MSD Detector (continued) Tokuthion Guthion	PEE.EL.081; IE.EL.119	EPA 3015 D; EPA 8270 E
Determination of Polychlorinated Biphenyls (PCBs), (Chromatographic Method) Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 Aroclor 1268 Aroclor 1262 Aroclor 1016	PEE.EL.082	EPA 8082 A
Gravimetric Determination of Moisture	PEE.EL.085	ASTM D4959-16
Determination of Fecal Coliforms (MPN)	PEE.EL.096	SM 9221 E/9221 C
Determination of Total Coliforms (MPN)	PEE.EL.097	SM 9221 B/9221 C
Gravimetric Determination of Organic Matter and Mrganic Carbon by Calculation	PEE.EL.099	NEN 5754
Mercury, Cold-Vapor Atomic Absorption Spectrometric Method	PEE.EL.102; PEE.EL.061	Standard Methods 3112 B Ed.24 2022; Digestion EPA 7471 A
Heterotrophic Plate Count, Pour Plate Method	PEE.EL.103	Standard Methods 9215 B Ed.24 2022
E. Coli, Standard Total Coliform Membrane Filter	PEE.EL.108	SM 9222 B; 9222 J (HACH 10029)
Pseudomonas Aeruginosa, Membrane Filter Technique	PEE.EL.109	SM 9213 E
Volatile Organic Compounds, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method Total Volatile Organic Compounds 1,1-dichloroethylene dichloromethane trans-1,2-dichloroethylene 1,1-dichloroethane 2,2-dichloropropane cis-1,2-dichloroethylene chloroform bromochloromethane 1,1,1-trichloroethane	PEE.EL.110	EPA 8260 C; Purge and trap (EPA 5030 C)

Test	In-house Method	Reference Method
Volatile Organic Compounds, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method (continued) Total Volatile Organic Compounds 1,1-dichloropropylene carbon tetrachloride 1,2-dichloroethane benzene trichloroethylene 1,2-dichloropropane bromodichloromethane dibromomethane trans 1,3-dichloropropene toluene cis 1,3-dichloropropene 1,1,2-trichloroethane 1,3-dichloropropane tetrachloroethylene dibromochloromethane 1,2-dibromoethane chlorobenzene 1,1,1,2-tetrachloroethane ethylbenzene m-xylene p-xylene o-xylene styrene cumene bromoform 1,1,2,2-tetrachloroethane 1,2,3-trichloropropane n-propylbenzene bromobenzene 1,2,4-trimethylbenzene 2-chlorotoluene 4-chlorotoluene tert-butylbenzene 1,3,5-trimethylbenzene sec-butylbenzene p-isopropyltoluene 1,4-dichlorobenzene 1,3-dichlorobenzene n-butylbenzene 1,2-dichlorobenzene 1,2-dibromo-3-chloropropane 1,2,3-trichlorobenzene hexachlorobutadiene naphthalene 1,2,4-trichlorobenzene	PEE.EL.110	EPA 8260 C; Purge and trap (EPA 5030 C)

Test	In-house Method	Reference Method
BTEX, Purge and trap Capillary-Column Gas Chromatographic/Mass Spectrometric Method Benzene Toluene Xylene Ethylbencene	PEE.EL.110	EPA 8260 C; Purge and trap (EPA 5030 C)
Metals by ICP-MS (Ag, As, Ba, Be, Cd, Cs, Co, Cr, Rb, U, V)	PEE.EL.125	EPA 3051A; EPA 6020 B

Chemical Measurements: lixiviates

Test	In-house Method	Reference Method
Temperature	PEE.EL.022	SM 2550B
pH	PEE.EL.021	Standard Methods 4500 H+B; EPA 9045 D
Total Solids	PEE.EL.028	Standard Methods 2540 B; Ed.24 2022
Total Fixed Solids	PEE.EL.028	Standard Methods 2540 E Ed.24 2022; HACH 8276; EPA 1684
Total Volatile Solids	PEE.EL.028	Standard Methods 2540 E Ed.24 2022; HACH 8276; EPA 1684
Total Alkalinity (Phenolphthalein titration)	PEE.EL.032	Standard Methods 2320B; HACH 8203
Determination of Carbonate by Volumetric Method and Calculation	PEE.EL.032	Standard Methods 2320B; HACH 8203
Determination of Chloride (Volumetric)	PEE.EL.043	SM 4500 Cl-B; HACH 8225
Determination of Sodium Chloride (by Calculation)	PEE.EL.043	SM 4500 Cl-B; HACH 8225
Spectrophotometric Determination of Sulfide	PEE.EL.065	SM 4500 S2-D; HACH 8131
Total Alkalinity, Volumetric	PEE.EL.032	Standard Methods 2320B; HACH 8203
Determination of Bicarbonate by Calculation	PEE.EL.032	Standard Methods 2320B; HACH 8203
True and Apparent Color	PEE.EL.033	Standard Methods 2120C; HACH 8025
Spectrophotometric Determination of Total Organic Carbon (TOC)	PEE.EL.051	SM 5310 C; HACH 10129 – LR; HACH 10173 – MR; HACH 10128 – HR

Chemical Measurements: electric oils

<u>Test</u>	<u>In-house Method</u>	<u>Reference Method</u>
Determination of Polychlorinated Biphenyls (PCBs), (Chromatographic Method) Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 Aroclor 1268 Aroclor 1262 Aroclor 1016	PEE.EL.073	EPA 600/4-81; ASTM D 4059

Chemical Measurements in the Field: emission from stationary combustion sources

<u>Test</u>	<u>In-house Method</u>	<u>Reference Method</u>
Particulate Matter, Gravimetry ¹	PEE.EL.02	EPA CFR 40 PT 60 Method 5
Determination Of Metal Emissions In Stationary Sources ¹ Atomic Absorption Spectrophotometry Method Pb, Ca, Cu, Co, Cr, Mn, Ni, Ag	PEE.EL.088	METHOD 29—Determination of Metals Emissions From Stationary Sources
Concentration of Gases (O ₂ , CO, CO ₂ , NO, NO ₂ , NOX, SO ₂) with Electrochemical Cells in Fixed Sources ¹	PEE.EL.03	CTM 30
CO (Non-Dispersive Infrared Method) ¹	PEE.EL.07	U.S EPA RFCA-1093-093
NO, NO _x , and NO ₂ (Chemiluminescence Method) ¹	PEE.EL.07	U.S EPA RFNA-1194-099
Ozone (O ₃) (Chemiluminescence Ultraviolet Photometer Method) ¹	PEE.EL.07	U.S EPA EQOA-0514-214
Sulfur Dioxide (SO ₂) (Fluorescence Method) ¹	PEE.EL.07	U.S EPA EQSA-0495-0100

Measurements in the Field:

<u>Test(s)</u>	<u>In-house Method</u>	<u>Reference Method</u>
Determining the Opacity Emission of Diesel and Exhaust Emissions of Gasoline Engines through Static Testing. Free Acceleration Method ¹	PEE.EL.018	NTE INEN 2 202: 2013; NTE INEN 2 207: 2002; NTE INEN 2 204: 2017

Chemical Measurements: air

<u>Test</u>	<u>In-house Method</u>	<u>Reference Method</u>
Measurement of Particulate Material PM 2.5 and PM 10 in Air ¹	PEE.EL.04	40 CFR Part 50, Appendix J, L, M
Sedimentable Particles ¹	PEE.EL.13	METHOD 502, Methods of Air Sampling and Analysis 3rd Edition Intersociely Committee, Lewis Publisher, INC 1988
Nitrogen Dioxide (Alternate Method (Passive) Through Diffusive Captors)	PEE.EL.055	Radiello "Nitrogen and Sulfur dioxides" UNE-EN 13528-1; UNE-EN 13528-2; UNE-EN 13528-3
Sulfur Dioxide (Alternate Method (Passive) Through Diffusive Captors)	PEE.EL.057	Radiello "Nitrogen and Sulfur dioxides" UNE-EN 13528-1; UNE-EN 13528-2; UNE-EN 13528-3
Ozone (Alternate Method (Passive) Through Diffusive Captors)	PEE.EL.060	Radiello "Ozone" UNE-EN 13528-1; UNE-EN 13528-2; UNE-EN 13528-3

Chemical Measurements: Beers and soft drinks

<u>Test</u>	<u>In-house Method</u>	<u>Reference Method(s)</u>
pH	PEE.EL.021	NTE INEN 2325.2002; NTE INEN 1087.1984

¹This laboratory performs field testing activities for these test methods.



Accredited Laboratory

A2LA has accredited

ELICROM CÍA. LTDA.

Guayaquil, ECUADOR

for technical competence in the field of

Chemical Testing

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 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 10th day of October 2023.

A blue ink signature of Mr. Trace McInturff, Vice President of Accreditation Services.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4286.02
Valid to August 31, 2025

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