# CERTIFICATE OF ACCREDITATION

*This is to attest*

## CIVIL ENGINEERING LABORATORY OF MACAU

AVENIDA WAI LONG NO°185
TAIPA, 999078, MACAU

**Testing Laboratory TL-1169**

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date December 16, 2024

IAS is an ILAC MRA Signatory

International Accreditation Service
Issued under the authority of IAS management

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# SCOPE OF ACCREDITATION

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## CIVIL ENGINEERING LABORATORY OF MACAU

www.lecm.org.mo

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*Accredited to ISO/IEC 17025:2017* *Effective Date December 16, 2024*

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| **Soil and Sediment Test** | |
| BS 1377-3:2018+A1:2021 | Methods of Test for Soils for Civil Engineering Purposes Part 3: Chemical and Electro-Chemical Testing<br>Chapter 7.3- Determination of Water-Soluble Sulfate in Soil (WS) |
| BS 1377-3:2018+A1:2021 | Methods of Test for Soils for Civil Engineering Purposes Part 3: Chemical and Electro-Chemical Testing<br>Chapter 9.2- Determination of Water-Soluble Chloride Content |
| BS 1377-3:2018+A1:2021 | Methods of Test for Soils for Civil Engineering Purposes Part 3: Chemical and Electro-Chemical Testing<br>Chapter 12- Determination of the pH Value |
| GB/T 50123-2019 | Standard for Geotechnical Testing Method<br>Chapter 56- Organic Matter Test |
| HJ 695-2014 | Soil- Determination of Organic Carbon- Combustion Oxidation Nondispersive Infrared Absorption Method |
| HJ 803-2016 | Soil and Sediment- Determination of Aqua Regia Extracts of 12 Metal Elements-Inductively Coupled Plasma Mass Spectrometry- Cadmium, Antimony, Chromium, Manganese, Copper, Nickel, Zinc, Arsenic, Lead |
| Laboratory Development Method, refer to HJ 803-2016 | Soil and Sediment- Determination of Aqua Regia Extracts of 12 Metal Elements-Inductively Coupled Plasma Mass Spectrometry- Mercury |
| **Water and Wastewater Test** | |
| APHA 1060 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Collection and Preservation of Samples |
| APHA 2120C 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Color (True and Apparent)- Spectrophotometric- Single-Wavelength Method |
| APHA 2130B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Turbidity- Nephelometric Method |
| APHA 2510B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Conductivity- Laboratory Method |
| APHA 2540D 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Total Suspended Solids Dried at 103-105°C |
| APHA 2550B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Temperature- Laboratory and Field Methods |

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| APHA 3030E 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Nitric Acid Digestion Part 2: Digestion for Trace-Level (≤0.1 mg/L) Concentrations for ICP and ICP-MS |
| APHA 3125 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Metals by Inductively Coupled Plasma-Mass Spectrometry- Lead, Iron, Nickel, Cadmium, Copper, Arsenic, Chromium, Antimony, Zinc, Manganese, Selenium, Aluminum |
| APHA 4500-Cl G 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Free Residual Chlorine- DPD Colorimetric Method |
| APHA 4500-$H^+$ B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, pH-Electrometric Method |
| APHA 4500-O H 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Dissolved Oxygen- Optical-Probe Method |
| APHA 5310B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Total Organic Carbon- High Temperature Combustion Method |
| APHA 5520B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Oil and Grease- Liquid-Liquid, Partition- Gravimetric Method |
| APHA 9215E 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Heterotrophic Plate Count- Enzyme Substrate Method |
| APHA 9223B 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Total Coliform Count and Escherichia Coli- Enzyme Substrate Test |
| GB/T 5750.4-2006 | Standard Examination Methods for Drinking Water - Organoleptic and Physical Parameters<br>Chapter 3- Odor and Taste<br>Chapter 4- Visible Substances to the Naked Eye |
| HACH Method 8000 | Method 8000, USEPA Reactor Digestion Method- Chemical Oxygen Demand |
| HACH Method 8023 | Method 8023, USEPA 1,5- Diphenylcarbohydrazide Method- Hexavalent Chromium |
| HACH Method 8038 | Method 8038, USEPA Nessler Method- Ammonia |
| HACH Method 8039 | Method 8039, Cadmium Reduction Method- Nitrate |
| HACH Method 8051 | Method 8051, USEPA SulfaVer 4 Method- Sulfate |
| HACH Method 8131 | Method 8131, USEPA Methylene Blue Method- Sulfide |
| HACH Method 10021 | Method 10021, Titanium Trichloride Reduction Method- Total Inorganic Nitrogen |
| HACH Method 10023<br>HACH Method 10031 | Method 10023 & 10031, Salicylate Method- Ammonia |
| HACH Method 10072 | Method 10072, Persulfate Digestion Method-Total Nitrogen |
| HACH Method 10209<br>HACH Method 10210 | Method 10209 & 10210, Ascorbic Acid Method- Reactive (Orthophosphate) and Total Phosphorus |
| HACH Method TNT 874 | Method TNT 874, Anionic Surfactants |

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| HJ 501-2009 | Water Quality- Determination of Total Organic Carbon- Combustion Oxidation Nondispersive Infrared Absorption Method |
| HJ 505-2009 | Water Quality- Determination of Biochemical Oxygen Demand after 5 days ($BOD_5$) for Dilution and Seeding Method |
| HJ 1001-2018 | Water Quality - Determination of Total Coliforms, Fecal Coliforms and Escherichia Coli - Enzyme Substrate Method |
| Laboratory Development Method, refer to APHA 3030E 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Nitric Acid Digestion Part 2: Digestion for Trace-Level (≤0.1 mg/L) Concentrations for ICP and ICP-MS- Mercury |
| Laboratory Development Method, refer to APHA 3125 23rd Edition, 2017 | Standard Methods for the Examination of Water and Wastewater, Metals by Inductively Coupled Plasma-Mass Spectrometry- Mercury |
| **Solid Waste Test** | |
| HJ 557-2010 | Solid Waste- Extraction Procedure for Leaching Toxicity. Horizontal Vibration Method |
| HJ 766-2015 | Solid Waste- Determination of Metals- Inductively Coupled Plasma Mass Spectrometry (ICP-MS)- Lead, Cadmium, Arsenic, Zinc, Chromium, Copper, Nickel |
| HJ/T 299-2007 | Solid Waste- Extraction Procedure for Leaching Toxicity. Sulphuric Acid and Nitric Acid Method |
| Laboratory Development Method, refer to HJ 766-2015 | Solid Waste- Determination of Metals. Inductively Coupled Plasma Mass Spectrometry (ICP-MS)- Mercury |
| **Air Quality Test** | |
| GB/T 15432-1995 | Ambient Air-- Determination of Total Suspended Particulates- Gravimetric Method |
| GB/T 18204.2-2014 | Examination Methods for Public Places- Part 2: Chemical Pollutants<br>Chapter 5.2-Respirable Suspended Particulates ($PM_{10}$)-Light Scattering Method<br>Chapter 6- Fine Particulate ($PM_{2.5}$)- Light Scattering Method<br>Chapter 7.2- Formaldehyde- Phenol Reagent Spectrophotometer Method |
| GB/T 18204.3-2013 | Examination methods for public places- Part 3: Airborne microorganism<br>Chapter 3.2 Total Bacteria Count- Impacting Method<br>Chapter 4.2 Total Fungi Count- Impacting Method |
| GB/T 18204.13-2000 | Methods for Determination of Air Temperature in Public Places |
| GB/T 18204.14-2000 | Methods for Determination of Air Humidity in Public Places |
| GB/T 18204.15-2000 | Methods for Determination of Wind Speed in Public Places |
| Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places | Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places<br>3.5.7 Respirable Suspended Particulates ($PM_{10}$) - Light Scattering Method |

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| Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places | Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places- Nitrogen Dioxide- Electrochemical Method |
| Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places | Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places- Total Volatile Organic Compound- PID Method |
| HJ 618-2011 | Determination of Atmospheric Articles $PM_{10}$ and $PM_{2.5}$ in Ambient Air by Gravimetric Method |
| Indoor Air Quality Instructions in General Public Establishments in Macau | Indoor Air Quality Instructions in General Public Establishments in Macau - Ozone- Real-Time Ultraviolet Photometry monitor |
| Indoor Air Quality Instructions in General Public Establishments in Macau | Indoor Air Quality Instructions in General Public Establishments in Macau - Radon- Electrostatic Method |
| Indoor Air Quality Instructions in General Public Establishments in Macau | Indoor Air Quality Instructions in General Public Establishments in Macau - Carbon Monoxide and Carbon Dioxide - Non-Dispersive Infrared Analyzers |
| **Noise Test** | |
| Dispatch of the Chief Executive No. 96/2020, Macau SAR Government | Despacho do Chefe do Executivo n.º 96/2020-Aprova a Norma sobre Acústica. |
| **Metal Composition Test** | |
| GB/T 4336-2016 | Carbon and Low Alloy Steel- Determination of Multi-Element Contents- Spark Discharge Atomic Emission Spectrometric Method (Routine Method)- Carbon, Silicon, Manganese, Phosphorus, Sulfur |
| GB/T 11170-2008 | Stainless Steel- Determination of Multi-Element Contents- Spark Discharge Atomic Emission Spectrometric Method (Routine Method)- Carbon, Sulfur, Manganese, Phosphorus, Silicon, Chromium, Nickel, Molybdenum |
| Laboratory Developed Method, refer to GB/T 11170-2008 | Stainless Steel- Determination of Multi-Element Contents- Spark Discharge Atomic Emission Spectrometric Method (Routine Method)- Nitrogen |
| Laboratory developed method, refer to GB/T 16597-2019 | Analytical Methods of Metallurgical Products- General Rule for X-ray Fluorescence Spectrometric Methods- Carbon and Low Alloy Steel & Stainless Steel- Manganese, Phosphorus, Silicon, Chromium, Nickel, Molybdenum |
| Laboratory developed method, refer to GB/T 16597-2019 | Analytical Methods of Metallurgical Products- General Rule for X-ray Fluorescence Spectrometric Methods-Lead Content of Welded Junctions |