Contact Information

Instituto Boliviano de Metrología
Av. Illimani, Zona Valle Hermoso, Municipio de Achocalla
La Paz - Bolivia

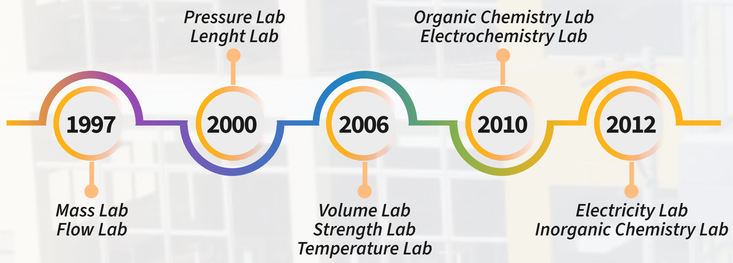
(+591) 2 2136034
(+591) 72555248
hpaco@ibmetro.gob.bo
mdelgado@ibmetro.gob.bo

Implementation of new infrastructure for IBMETRO metrology laboratories

By Director of the Industrial and Scientific Metrology Directorate:
Henry Paco Mariño

Start

The IBMETRO laboratories have been in operation since 1997, initially offering services in the magnitudes of mass, flow, and large volumes, which at the time were fundamental to supporting the country's productive sectors. However, as companies' measurement needs increased, new magnitudes such as pressure, length, and force, among others, were implemented until 2006. Over the years, the demand for new services to meet industry requirements grew, leading to international support. One example is the technical cooperation of PTB and other National Metrology Institutes (NMIs) in the region, which have strengthened the technical capacity of both personnel and the institution, contributing to the development of new magnitudes. Thus, until 2012, the last magnitudes in chemistry and electricity were implemented.



All these magnitudes were gradually implemented over the years, making it increasingly evident that additional space was needed to continue with the implementations. By then, 12 laboratories had been established and accommodated in spaces that were becoming increasingly smaller.
In 2015, the laboratories received significant support for their strengthening through KOICA (Korea) cooperation projects and, in parallel, the PTB (Germany) project. These projects marked a crucial turning point, as they allowed the testing of newly acquired capabilities in the magnitudes of mass and electrochemistry. These capabilities were key to obtaining the first international recognitions in the Quality System Task Force (QSTF) of the Inter-American Metrology System (SIM), representing an important milestone. These achievements became the foundation for other magnitudes to follow the same path of international recognition.

- ✓ **2015** Mass Laboratory, Electrochemistry Laboratory
- ✓ **2016** Volume Laboratory
- ✓ **2017** Temperature Laboratory
- ✗ **2018** Density Laboratory, Force Laboratory, Conductivity Laboratory

The continuity of recognitions was maintained until 2018, when, unexpectedly, the magnitudes presented to the QSTF were not approved. This situation was partly due to the lack of staff experience and the laboratory conditions at the time. Additionally, social factors affected the process, such as the electoral period in the country and, later, the pandemic that impacted many nations.

The Dream

In 2015, research work began thanks to the received cooperation, which facilitated the collection of key information for designing a dream: having adequate infrastructure to implement laboratories focused on improving measurement scopes and capabilities. Part of the information was obtained through technical visits to other National Metrology Institutes (NMIs) in the region, such as Colombia, Brazil, and Peru, and also with the support of expert metrologists from PTB in Germany, who provided the first guidelines for structuring what would be the construction project for the new laboratories.
Additionally, internal meetings, workshops, and events were held with our own experts and visionaries, who contributed ideas for implementation. These proposals were also shared with construction experts, who consolidated the initial laboratory design.
However, it was necessary to wait three years to resume the project between 2018 and 2021, during which efforts were made to restart the recognitions and, in parallel, strengthen the construction design of the laboratories.
In 2022, contracting processes began, consolidating the start of construction in June, with a projected completion period of 380 days.
At the same time, recognitions were resumed with renewed momentum, presenting three new magnitudes (density, force, and humidity). In 2023, the magnitudes of (inorganic, mass, large volumes, flow, and electrical magnitudes) were incorporated, and in 2024, conductivity and time were included. Additionally, for the first time, Proficiency Testing was presented as part of the scope in physical and chemical magnitudes.

Obstacles Along The Way

During the design, construction, and implementation process of the project, several challenges arose, somewhat affecting the full development of the new laboratories. The main obstacles included:

Terrain adjustments The initially designated land underwent surface modifications, requiring the redesign of several integrated systems. These changes impacted key execution aspects.

Import issues Due to the country's geographical location, without direct access to a seaport, import processes were slower and more expensive than expected. This required adjusting the project's original budget.

Weather conditions Inclement weather delayed the project's progress by three months. However, this delay was not significant considering the 28-year wait to finally access the new laboratories.

Equipment relocation Moving the equipment from the old facilities to the new ones was also a major challenge. Special precautions were necessary, especially for transporting sensitive equipment such as the atomic clock, mass comparators, mass spectrometers, and the calibration system for flow and large volumes. All these devices required additional care during installation in the new spaces.

About The Construction Project

The IBMETRO construction project is located in the department of La Paz - BOLIVIA, in the center of South America.
The land has a usable area of 6704.71 square meters, on which four blocks were projected as described below.



Main Block
It is located in the center of the site and houses laboratories, offices, recreation and/or rest areas, as well as all the facilities that support the mentioned uses. It has a total area of 7,932.04 square meters distributed across four levels.



Secondary Block
Dedicated to large volume and hydraulic laboratories.



Transformer Block
Adjacent to the access road, housing transformers, the generator, and the monitoring and access control room.



Water Treatment Plant Block
Located in the southeastern part of the land.

For the construction of IBMETRO's new laboratory infrastructure, technical construction aspects were considered, primarily classified into nine key systems, each with specific characteristics regarding measurement condition requirements. These systems are summarized below:



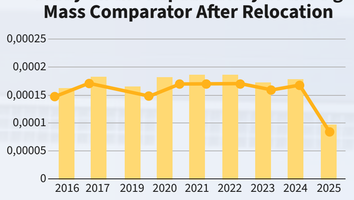
Implementation

Various precautions were taken when moving equipment to the new facilities. Subsequently, an important stage began, consisting of validating measurements in the new environments. This process involved pre- and post-relocation verifications and environmental condition assessments, including characterizing critical spaces. The results confirmed that the new spaces are significantly more suitable and stable than the previous ones, ensuring an optimal measurement environment.

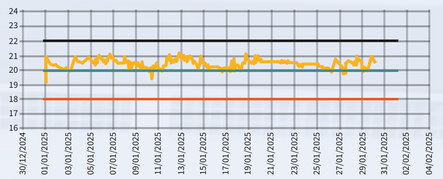
Comparative Graph of Environmental Conditions in the Volume Laboratory – Feb 2024 and Feb 2025



Study on the Repeatability of the 6 g Mass Comparator After Relocation



Temperature Stability in the Mass Laboratory



As part of the implementation, peer evaluations were received in various magnitudes such as mass, temperature, and conductivity, among others, which supported the new scopes recognized before the SIM QSTF until 2024 under ISO 17043, ISO 17034, and ISO 17025. To date, this has resulted in 15 recognitions in QSTF across approximately 100 scopes in different magnitudes.
Subsequent visits were also received from experts from INMS, including Brazil, Costa Rica, Argentina, and others, who verified the proper installation and implementation of the laboratory equipment.

Projections

With the new infrastructure, the implementation of new magnitudes is planned, including sonometry, photometry, vibrations, hardness, and solid density, among others. Additionally, efforts will be made to improve measurement scopes in areas such as mass, temperature, humidity, and force.
Furthermore, technical regulation implementation support will be provided in key sectors like energy efficiency, water, and agroindustry.
Lastly, IBMETRO personnel will be trained to offer technical assistance to other national laboratories and potentially other NMIs, leveraging the experiences gained so far. We always appreciate the support received from the mentioned institutions, which has been fundamental in this process.

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