



18th meeting of the CCM
Written report covering the period 2019 – 2020
Mass and Related Quantities Laboratory
Laboratorio Tecnológico del Uruguay – LATU

➤ *Related activities*

- **CMC approved in pressure on 01 september 2020, description:**
 - Gauge pressure: gas medium: 1.00E5 Pa to 7.00E6 Pa
 - Pressure measuring device
 - Absolute expanded uncertainty: 1.2E2 Pa to 4.0E2 Pa
 - Direct comparison

- **Participation in project:**
 - **“Strengthening National Metrology Institutes in the Hemisphere, in support of emerging technologies”**

 - **Sub-Project: “Calibration of weighing instruments Microbalances”**

Propose:

1. - Validation of an alternative method for the calibration of instruments for non-automatic operation with resolution less than or equal to 1 µg (microbalances or ultra-microbalances).
2. Generate experience in micro - weights calibration for microbalance calibration at values less than 1 mg.

Status:

1. The first draft of the SIM Guide for Microbalance Calibration with general harmonized criteria for application was completed. The document will be sent for review to the technical experts of the SIM MWG7 mass sub-group. It will be published on the SIM's official website for consultation and English translation is under way.
2. Article on handling and calibration of micro - weights in the process of being developed

- **“Maintaining and disseminating the new SI unit kilogram via spheres of natural silicon- In the cleaning process”**

Status: It continues to be measured as planned, processing the data and sending it to PTB.

- **“SIM kilogram dissemination project: Protocol for mass drift studies”**

Status: It continues to be measured as planned, processing the data and sending it to NRC.



➤ *Participation in relevant comparisons*

- **SIM Comparison in mass standards (SIM.M.M-K6)**, a cylindrical shaped mass with nominal value 50 kg made in stainless steel.
Status: Report in progress. Measurements completed.
- **SIM Comparison High-accuracy hydrometers (SIM.M.D-S6)**, Density from 600 kg/m³ to 1300 kg/m³.
Status: in progress. Measurements completed.
- **SIM Calibration of glassware and volume devices (SIM.M.FF-K4.1)**. Volume of liquid at 20 L (contained). Volume of liquid at 100 mL (contained).
Status: In progress.
- **SIM Comparison in Pressure measurements (gauge mode) (SIM.M.P-S10)**, Pressure: 700 kPa, 1400 kPa, 2100 kPa, 2800 kPa, 3500 kPa, 4200 kPa, 4900 kPa, 5600 kPa, 6300 kPa and 7000 kPa.
Status: Final report (2020). Results ok.

➤ *Acquired new equipment*

- Automatic Mass Comparator, Sartorius, for calibration weights 1 kg to 10 kg, with resolution of 0,1 mg, it was acquired. This equipment will with better uncertainties.

➤ *Papers and Publications*

1. **"Comparative study of the density of water and its application in the uncertainty budget for the volume determination"** Sica A., Preste S., Almeida G., Esteves R. In INNOTECH 21 (2021).
2. **"Four experiences of automation in metrology and its impact on quality risk and operational efficiency"** Constantino P., Acquarone A., Mazini M., Robatto O., Ponticorbo V., Fajardo S. In: INNOTECH 16 (2018).
3. **"Digitalization and robotization of gauge blocks calibration by mechanical comparison"** Constantino P., Acquarone A., In: INNOTECH 21 (2020).