

# PROFICIENCY TESTING – TEMPERATURE CALIBRATION

## Interlaboratory comparison organized in 2020

10<sup>th</sup> INTERNATIONAL METROLOGY CONGRESS  
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### Context

- In 2020, CT2M organized an interlaboratory comparison on temperature calibration in which 26 laboratories participated. Among them were calibration laboratories (accredited or not) but also laboratories performing internal calibrations and / or periodic verifications of their temperature sensors.
- The interests of participating in a comparison of this type are many : assess the suitability of the calibrations, ensure the quality of the results, meet normative and accreditation requirements, check the correct application of the calibration method and evaluate the reproducibility of results.

### PROFICIENCY TESTING ITEMS

- ✓ Delta Ohm HD 2107.1 temperature indicator with 0.01°C resolution
- ✓ Pt100 probe Ø6 x 100mm with silicone cable length 3m



### PROCEDURE

- ✓ **Recommended calibration method:** comparison method with several simultaneous readings of the reference measurement chain and the proficiency test item.
  - ➔ Each laboratory used **its own procedure** and was free to choose the **number of comparisons** (between 3 and 10)
- ✓ The participants used their **own means of calibration:**
  - A reference temperature measurement chain
  - Comparison medium (bath, oven, thermostatic chamber)

### GENERAL OBSERVATIONS

#### Calibration temperatures

- Most commonly encountered temperatures in a testing laboratory : -20°C, 5°C, 20°C, 37°C and 105°C

#### Participants results and outliers

- Normal distributions of results
- One outlier for each temperature between -20°C and 37°C ; three outliers at 105°C
- Heterogeneous uncertainties

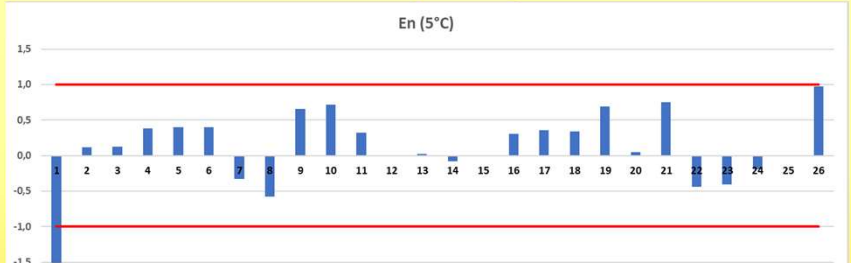
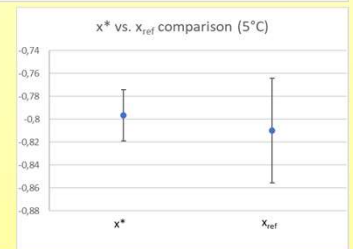
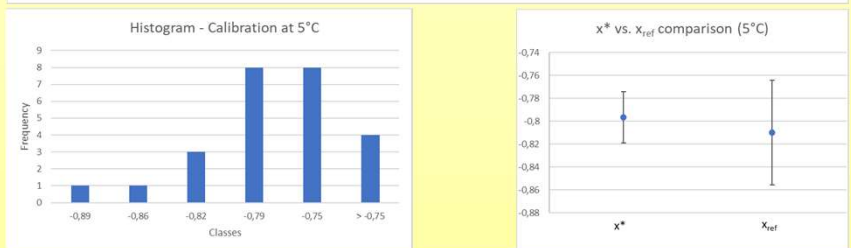
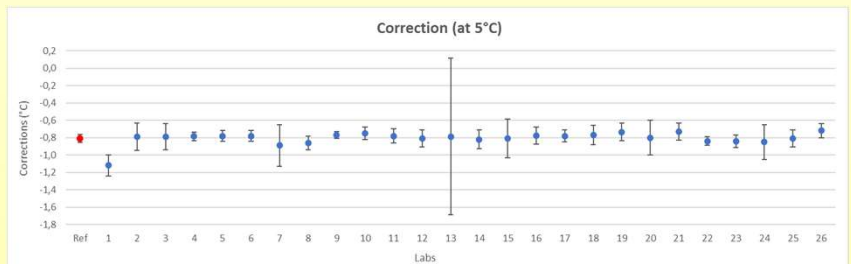
#### Assigned values and associated uncertainties

- Good correspondence between the robust means of participants and the reference values (reference laboratory)  $|En| \leq 0,6$  except for 105°C  $|En| = 1,2$

#### Evaluation of the participants performances

- Good performances for all ISO 17025 accredited laboratories
- Degraded performances ( $En$  and z-score) for laboratories using a calibration oven or a reference thermometer with a too high resolution

### EXEMPLE OF RESULTS FOR CALIBRATION AT 5°C



### Conclusion

- This interlaboratory comparison bringing together a sufficient number of laboratories (26) made it possible to highlight several conclusions.
- Laboratories with degraded performances must question their calibration means and methods (number of comparisons, reference thermometer resolution, comparison medium and used fluid, ...)