ABSTRACT

The purpose of the inter-laboratory comparison between meteorological calibration services is reliable, ensuring, improving the quality of measurements, control performance standards and measurement process, their limitations and their behavior over time. The challenge then is to demonstrate and understand the performance and capacity of participants in the field of Metrology.

Which improves the level of trust of users and also between laboratories, their clients, auditors and accrediting bodies, and therefore confidence in the measured data.

Summary

Introduction

Accordance with the requirements of IEC / ISO 17025 and in particular clause 9 of Chapter 2 Standard: "Proficiency Testing / Inter-Laboratory Comparisons", the Regional Instrumentation Centre for the Region I-Africa Casablanca propose a program of inter-comparison in fields of Pressure, temperature and humidity.

Objectives

The purpose of the inter-laboratory comparison is reliable, ensuring, improving the quality of measurements, control performance standards and measurement process, their limitations and their behavior over time. The challenge then is to demonstrate and understand the performance and capacity of participants in the field of Metrology.
This improves the level of trust between laboratories, their clients, auditors and accrediting bodies, and therefore confidence in the measured data and the reliability of their operation.

Test instrument

Designation	
Identification	
Serial number	
Manufacturer	
measuring range	
Calibration points	

Calibration method

It is to compare the information provided by the instrument to be calibrated to those of the reference standard.

Calibration is performed by the method of comparison is based on COFRAC LAB GTA 08 (2005) and LAB guides: GTA 17 (2005) and LAB: GTA 11 (2005).

The instrument to be calibrated and the calibration are placed in a stabilized generator. When equilibrium is established, measurements are performed on the reference and the instrument to be calibrated. To the extent possible, measures scans are done in the same time for the standard and the instrument to be calibrated. The average measurements for each series is retained. It then compares the value obtained for the instrument than the standard corrected its calibration certificate.

Preliminary operations

1- Note the identification of the instrument to be calibrated;

2- ensure no visible mechanical defects;

3- to ensure the cleanliness and condition of the instrument;

4- the test environment must be stable and without influence of direct radiation as much as possible;
5- Ensure the absence of oxidation or humidity around the connections son otherwise track, cleaning it by using appropriate means.

Procedure

1- Adjust the setpoint generator to the measuring points.
2- Operate standard and the instrument to be calibrated with the generator.
3- Wait for the stability of the generator.
4- Addressing simultaneously measures the chain to be calibrated and the reference respecting not scan data.

Specific conditions

In case of subcontracting, it is entrusted to a competent subcontractor. Participants will be notified calibrations subcontracted without indicating the subcontractor to maintain confidentiality.

Subcontracting may relate primarily calibrations including the organizer of interlaboratory comparison was not the best calibration uncertainty or lack of resources or technical expertise momentarily sufficient for the realization of a type of calibration.

Furthermore,

- If the own laboratory method is different from that of this Protocol. The method used should be explained in the calibration certificate.

- The organizer must be informed of any defect or damage due to dropping or mishandling of the instrument before proceeding circuit intercomparison.

Results

Example of hygrometer at 20°C

95 HR%		50 HR%		15 HR%		
Inst.	Ref	Inst.	Ref.	Inst.	Ref.	Mesure
						1
						2
						3
						4
						5
						6
						7
						8
						9

						10
						Mean of HR%
						Correction in HR%
						Repeatability in HR%
						Uncertainty (k=2) in HR%

Example of thermohygrometer at 50 HR%

50 °C		25 °C		0°C		
Inst.	Ref.	Inst.	Ref.	Inst.	Ref.	Mesure
						1
						2
						3
						4
						5
						6
						7
						8
						9
						10
						Mean in °C
						Correction in °C
						Repeatability in °C
						Uncertainty (k=2) °C

Calcul of errors

Corrections are calculated as fellow : (example of thermohygrometer)

$$C_H = \overline{H}_{rc} - \overline{H}_m \quad \text{and} \quad C_T = \overline{T}_{rc} - \overline{T}_m \quad (3)$$

where : H_m , T_m are the means humidity and temperature of test instrument.

H_{rc}. are the means humidity and temperature of reference

Repeatability

Repeatability errors are estimated from the exeprimental standard deviation .

Depending to the number of repetion of measurments, repeatability errors are calculated os fellow:

$$E_{fH} = \sqrt{\frac{\sum_i^n \left(H_i - \overline{H}\right)^2}{n-1}}$$ is the standard deviation in humidity

$$E_{fT} = \sqrt{\frac{\sum_i^n \left(T_i - \overline{T}\right)^2}{n-1}}$$ is the standard deviation in temperature

Notes

- The indications are rounded according to reference resolution and chain to calibrate. - Note that for calibration thermohygrometers, the contribution of the uncertainty of repeatability is an important part, therefore we plan to study the repeatability of laboratories:
    - determine the standard deviations of repeatability and reproducibility,
    - perform statistical tests
    - determine the repeatability and reproducibility of the method,
    - determine the robust standard deviation and standard deviation of ability,
    - study the stability of the instrument object intercomparison.