Thermal Laboratory

Thermal calibration laboratory is accredited by NABL (Accreditation Number: CC-2287). Laboratory is having facility for comparison as well as fixed point calibration method. This laboratory is equipped with very hi**gh accuracy standards and primary standard (**fixed point calibration set up**)**. All standard instruments are traceable to national / international standards.

- **The Comparative Calibration**

As the name already implies, this type of calibration is carried out by comparing the resistance thermometer being tested with a higher-quality reference thermometer. The higher-quality reference should thus exhibit an accuracy of three or four times higher than the thermometer being tested. Both thermometers are placed into a single homogenous temperature source. When placing the thermometers, care should be taken to ensure a small distance between them and that the sensitive points (meaning the measuring points) are at the same height. As a temperature source, liquid baths or dry-well calibrators are generally used.

- **The Fixed Point Calibration**

The fixed point calibration, in contrast to the comparative calibration, is carried out against the defined triple, freezing and melting points from the International Temperature Scale of 1990 (ITS-90). The fixed points define temperatures at which the physical state of substances alters. The most important fixed point of the ITS-90 is the triple point of water. At a temperature of 0.010 °C the physical state of high-purity water is constantly changing between steam, ice and liquid water. The quantities of the physical states always remain in proportion. Generally, only national laboratories or laboratories qualifying for very small measurement uncertainties work with these fixed-point cells, as these are specialised only for this application. Highly stable PRTs (platinum resistance thermometers), which will be used as reference thermometers, are calibrated using the fixed point method. The reference sensor is inserted into a closed, or also open fixed-point cell, which holds the temperature constant over a long period.

Fig. Triple Point of Water

Fig. calibration Set Up

Thermal Laboratory performs calibration of variety of temperature and humidity measuring instruments.

1. Comparison Method :

- RTD, Thermocouple (with and without indicator)
- Digital temperature indicator / Data Logger etc with sensors
- Liquid in glass thermometer
- IR / Non Contact thermometer / Pyrometer
- Temperature indicator of cold chambers, ovens, incubators, furnaces, bath etc at single position
- Temperature chambers / deep freezers / oven etc ***(on site calibration)***
- RH indicator of environmental chambers / RH chambers / RH generators ***(at single position)***
- Humidity indicator with sensor of Humidity chamber / environmental chamber

Instrument	Temperature Range	CMC
RTD, Thermocouple (with and without indicator), Digital temperature indicator / Data Logger etc with sensors	-80 to 140°C 140°C to 660°C	0.09°C 0.23°C
Liquid in glass thermometer	-50°C to 250°C	0.17°C
Thermocouple (with and without indicator) / Data Logger etc with sensors	>660°C to 1000°C	1.20°C
IR / Non Contact thermometer / Pyrometer	50°C to 500°C	5.7°C
Temperature indicator of cold chambers, ovens, incubators, furnaces, bath etc at single position	-80 to 660°C 660 to 1000°C	0.23°C 1.45°C
RH indicator of environmental chambers / RH chambers / RH generators (at single position)	25% RH to 95% RH @ 25°C	1.22%RH
RH indicator of environmental chambers / RH chambers / RH generators (at single position)	95% RH @ 25°C to 70°C	1.80%RH
Humidity indicator with sensor of Humidity chamber / environmental chamber	10% RH to 95% RH @ 25°C 95% RH @ 25°C to 70°C	1.3%RH 1.3%RH
Temperature chambers / deep freezers / oven etc	-80 to 0°C 0 to 250°C	1.2°C 2.5°C

2. **Fixed Point Method:**

- SPRT / PRT with or without readout device

Fixed point	**Temperature Range**	CMC
Boiling Point of Liquid Nitrogen	-196.798°C	1.6mK
Triple Point of Mercury	-38.8344 °C	2.2mK
Triple Point of Water	0.01 °C	1.3mK
Melting Point of Gallium	29.7646 °C	3.0mK
Freezing Point of Tin	231.928 °C	3.3mK
Freezing Point of Zinc	419.527 °C	3.2mK
Freezing Point of Aluminium	660.323 °C	4.4mK