TRINIDAD AND TOBAGO
BUREAU OF STANDARDS

## Metrology Division

# CALIBRATION SERVICES


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# Calibration Terminology

| | |
|---|---|
| **Calibration** | A comparison of the output of a measuring instrument against a reference instrument of higher accuracy and reporting the result with the estimated measurement uncertainty . |
| **Adjustment** | Changing the output of the measuring instrument to correspond to the output of a reference instrument. |
| **Traceability** | A traceable measurement can be related to appropriate national or international standards through a documented, unbroken chain of comparisons. |
| **Uncertainty** | The quantified doubt that exists about the result of any measurement, calculated from three main sources: the reference used, the unit under calibration, and the calibration process used. |
| **Calibration Interval** | The time between successive calibrations of an instrument. |

# ABOUT US

Calibration Services represent the Industrial Metrology arm. Calibration services are provided to industries in Trinidad and Tobago as well as regionally to other countries within CARICOM.

## 1986

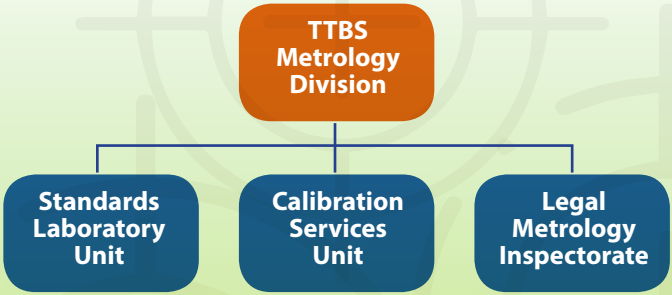
The Metrology Laboratory began as a Section of the Laboratory Testing Division. It was initially established to provide traceability and technical support for the Weights and Measures Division. However, calibration work for the users of measuring insstruments in industry was the main activity.

## 1997

Through funding provided by the World Bank under the BEIRL project, the Metrology Laboratory upgraded/developed a series of internationally recognized measurement capabilities in mass, dimension, volume, pressure and temperature.

## 2004

The Metrology Act was passed and in 2006, the Metrology Division was established comprising of three (3) units - Standards Laboratory Unit, Calibration Services Unit and Legal Metrology Inspectorate.



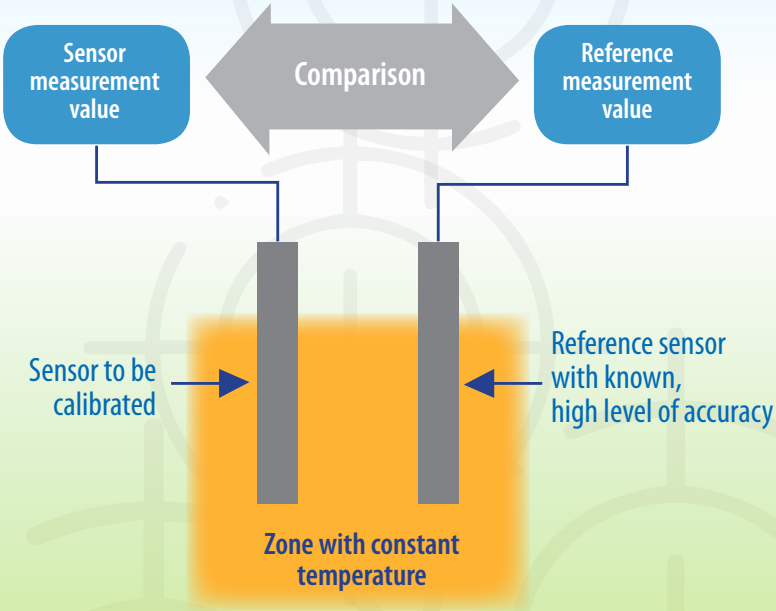

We are continually improving our technology, facilities, and capabilities to provide the high quality services you expect from TTBS, the National Metrology Institute (NMI) of Trinidad and Tobago.

# What is Calibration?

According to the "International Vocabulary of Metrology – Basic and general concepts and associated terms (VIM)"

Calibration is an operation that, under specified conditions -
**In a first step...** *"establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and…"*

**In the second step...** *"uses this information to establish a relation for obtaining a measurement result from an indication."*



# Why Calibrate?

All instruments, even the highest performing measurement instruments drift over time. Drift can be caused by dirt and chemicals in the ambient air, temperature changes, component deterioration, handling and frequency of use, etc.

Regular calibration can identify and track incremental sensor drift and verify that instruments are operating within the required specifications.

Choosing the right calibration laboratory and service supplier can be as important for lifetime accuracy and reliability as the initial selection of the instrument.

## Calibration supports the optimum performance of measuring instruments which can:

- Satisfy regulatory, contractual and customer requirements Increase production yields
- Optimize resources
- Ensure consistency and compatibility with measurements made elsewhere
- Support quality assurance efforts

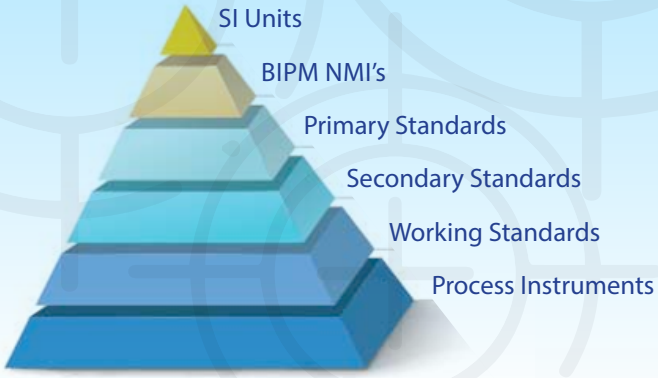
## Calibration information can indicate:

- If the instrument is performing optimally
- The suitability of an instrument for its chosen purpose whether an instrument is reliable or consistent
- Whether adjustment or repair is required before the instrument fails completely

# How do we meet your calibration needs?

**We meet your Calibration needs by:**

- Using measurement standards and measuring instruments whose measurement values/readings are traceable to national and international measurement standards and by extension to the SI Unit.




- Working in conditions conducive to good measurement performance.
- The application of well established and documented international measurement practices.
- Maintaining a network of international linkages.

A2LA ACCREDITED
CERTIFICATE #5800.02

## Accredited Calibration

ISO/IEC 17025 is the international standard used to accredit testing and calibration laboratories for measured quantities.

We offer calibration services accredited by one of the world's leading accreditation body, the **American Association for Laboratory Accreditation (A2LA).**

See A2LA's website for full scope of accreditation - Certificate Number 5800.02.
**https://customer.a2la.org/index.cfm?event=directory.detail&labPID=FC7B019C-6E15-4051-B7E4-425798BCA8D9**

# What documentation can you expect?

**Calibration Certificate/Report:**

Contains all the requirements specified in the ISO/IEC 17025:2017 standard: including unique identification, calibration method performed, traceability statement, measurement readings (As Found and As Left, where applicable), identification of person performing the calibration and measurement uncertainties.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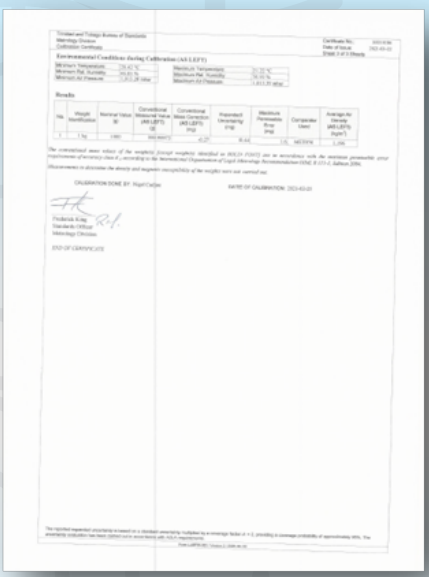
Calibration Certificate



**Calibration Sticker**
**Attached to the Calibration Certificate**


***Note: The recalibration due date is only printed on the calibration certificate and calibration sticker when written instructions have been provided by the customer.***

# Mass Calibration - Weights

The TTBS Mass Calibration Laboratory provides calibration of OIML R111 Class E2 to M3 and ASTM Class 1 to 7 weights.

The TTBS Mass Calibration Laboratory's Calibration and Measurement Capabilities (CMC) for the calibration of OIML Classification E2 weights were published in the International Bureau of Weights and Measures (BIPM) Key Comparison Database (KCDB) in December 2020.

The TTBS Mass Calibration Laboratory is also accredited by the American Association for Laboratory Accreditation (A2LA) to ISO/IEC 17025:2017.

This means:

- International recognition of calibration results. Quality Assurance of test and calibration data. Appropriate and valid methods.
- Traceable measurements to the SI Unit.
  Appropriate use of measurement uncertainty. Technically competent staff.

**Analytical Weight Sets**
(1 mg to 10 kg)
Stainless Steel

**Single weight**
(1 mg to 1000 kg)

**Weight Sets**
(1 g to 1000 kg)
Brass or Cast Iron

# Mass Calibration - Weighing Instruments

The TTBS Mass Calibration Laboratory is also accredited by the American Associa-tion for Laboratory Accreditation (A2LA) to ISO/IEC 17025:2017 for the calibration of Non-Automatic Weighing Instruments (NAWI).

Calibration of weighing instrument are performed on-site.

We calibrate weighing instruments up to 20,000 kg

**Some of the weighing instruments we calibrate are:**

- Analytical balances
- Triple-Beam scales
- Spring scales
- Mechanical scales
- Moisture balances
- Electronic and mechanical platform scales
- Dynamometers


# Pressure Calibration

The Pressure & Torque Calibration Laboratory provides calibration services for all pressure measuring instruments up to 30,000 psi (200 MPa or 2000 bar), in any of the available pressure units.

**Some of the pressure measuring instruments we calibrate are:**

- Dead Weight Testers
- Pressure Gauges (Mechanical and Digital)
- Vacuum Gauges (from –14.5 psi to 0 psi)
- Pressure Calibrators
- Pressure Indicators Pressure Modules
- Barometers

Dead Weight Tester


Digital Pressure Gauge


Mechanical Pressure Gauge


Pressure Module


Pressure Calibrator

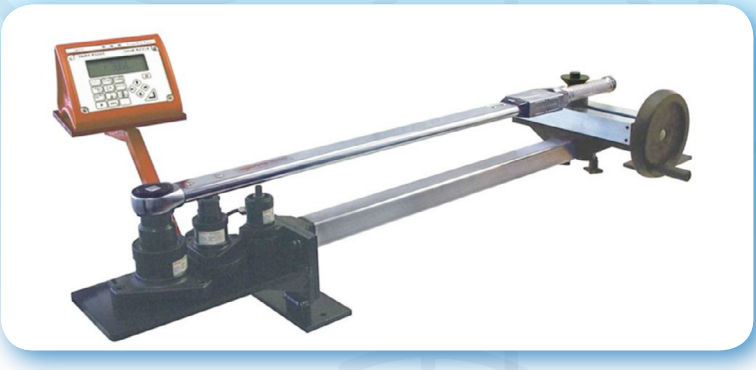
Barometer

# Torque Calibration

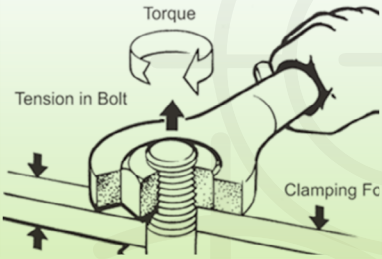
The Pressure & Torque Calibration Laboratory provides calibration of:

- **Torque wrenches (up to 1500 N·m or 1100 ft lbf)**
- **Torque testers (bottle closure testers)**

Torque wrenches are calibrated in accordance with the international standard ISO 6789: Assembly tools for screws and nuts - Hand torque tools.



**Reference Instrument (Torque Wrench Calibrator with Smart Torque Transducer) used for calibrating torque wrenches.**




**When a bolt is torqued properly, it remains under constant stress and is immune from fatigue**

# Dimensional Calibration

The Dimension Calibration Laboratory provides routine calibrations for the following dimensional measurement instruments:

- Gauge Block Sets (up to 100 mm)
- Gauge Blocks over 100 mm (verification)
- Internal and External Micrometer Gauges (0 mm to 1000 mm)
- Vernier Calipers (0 mm to 1000 mm)
- Dial Gauges (0 mm to 50 mm)
- Height/Depth Gauges (0 mm to 600 mm)
- Measuring Tapes (0 m to 100 m)
- Steel Rules (up to 1000 mm)
- Coating Thickness Gauges (0 µm to 1900 µm)
- Ultrasonic Thickness Gauges (0 mm to 200 mm)

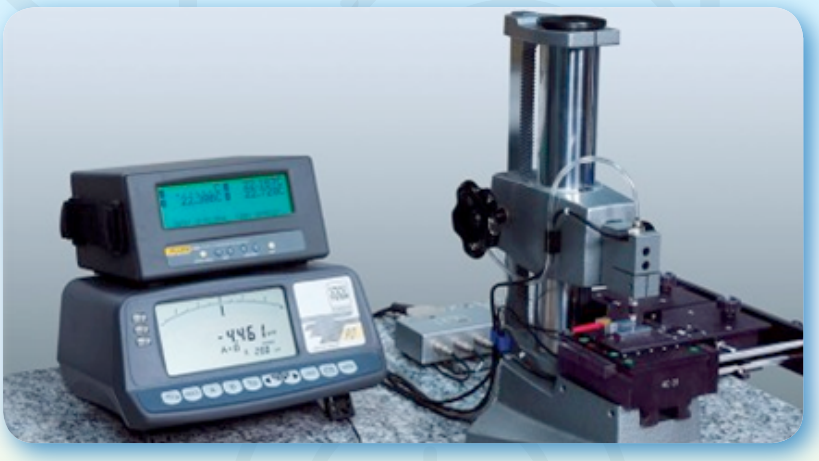
***Note: If you have other length measuring instruments not listed above you can call or email us and we will assess to see if we can calibrate your instruments.***

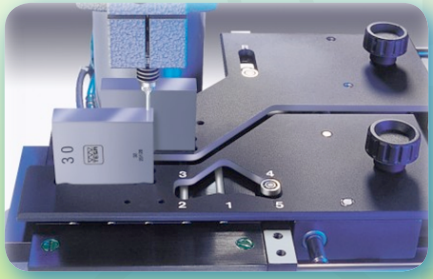

**Reference Instrument used for calibrating rulers and tapes.**

# Dimensional Calibration

The reference standard used for routine calibration of length measuring instruments are gauge blocks. Our reference gauge block set , which is calibrated at a higher level NMI, is used to disseminate the SI Unit of length to other Secondary Reference and Working Standard gauge block sets.

These calibrations takes place in our Dimensional Calibration Laboratory using a highly accurate electro-mechanical comparator.





# Volume Calibration

The Volume & Density Calibration Laboratory provides calibration services for the following volume measuring instruments:

- **Volumetric Flasks (one mark and graduated)**
- **Pipettes (one mark and graduated)**
- **Burettes**
- **Measuring Cylinders**
- **Pycnometers**
- **Volumetric Provers (up to 20 L)**
- **Tanks and Vessels (up to 500 L)**

The Volume Calibration Laboratory is accredited by the American Association of Laboratory Accreditation (A2LA) to ISO/IEC 17025:2017 for the calibration of one mark volumetric flasks and one mark pipettes.

*See A2LA website for our accredited scope of calibration.*

**Pipette Calibration**

**Volumetric Prover**

# Density Calibration

The Volume & Density Calibration Laboratory provides calibrations services for the following measuring instruments:

- **Hydrometers** (Measuring Range: 700 kg/m$^3$ to 1300 kg/m$^3$ )
- **Digital hand-held density meters**

**Hydrometer Calibration**

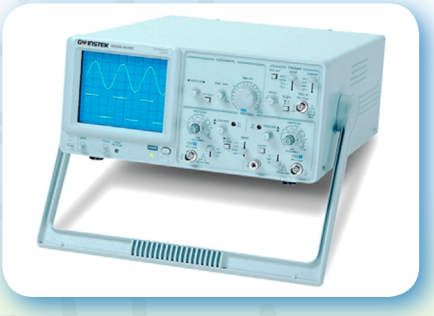
**Density Meter Calibration**

**The Reference Instrument used for density calibrations is an Anton-Parr DMA 500 Density Meter.**

# Electrical Calibration

The Electrical & Time Calibration Laboratory provides calibration services for the following electrical measuring instruments:

- Handheld multimeters
- Precision multimeters
- Ammeters including clamp on meters
- Thermocouple/RTD calibrators
- High voltage test sets up to 35 kV
- Resistance Boxes and precision resistors
- Ohm meters and insulation resistance meters
- Scopemeters and oscilloscopes
- Temperature display units
- Process calibrators
- Multifunction calibrators

**Reference Standard Measuring Instruments - Multifunction Calibrators**

# Time Calibration

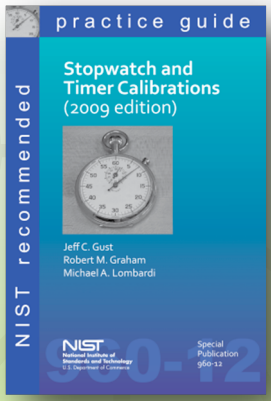
The Electrical & Time Calibration Laboratory provides calibrations services for the following time measuring instruments:

- **Stopwatches**
- **Timers**

**Digital Stopwatch**

**Analogue Stopwatch**


**Timer**


**Reference Instruments (Agilent Technologies Universal Counter and Waveform Generator) used for calibrating stopwatches and timers.**

# Temperature Calibration

The Temperature & Humidity Calibration Laboratory provides calibration services for the following measuring instruments:

- Platinum Resistance Thermometers
- Thermometers
- Liquid in Glass Thermometers
- Mechanical Thermometers
- Infra-Red Thermometers
- Resistance Thermometers
- Thermocouples
- Digital Thermometers
- Sling Psychrometers

We calibrate temperatures from -40 °C to 660 °C. Calibrations can be conducted in any of the units of temperature - Kelvin (K), Celsius (°C) or Fahrenheit (°F).

Our accredited calibration uncertainties range from ±0.003 °C to ±0.18 °C for calibrations in the range -40 °C to 660 °C as appropriate, in circulation baths and fixed point cells.

We also perform on-site calibration of temperature-controlled devices:

- Ovens
- Refrigerators
- Incubators
- Waterbaths

# Humidity Calibration

The Temperature & Humidity Calibration Laboratory provides calibration services for the following measuring instruments:

- **Hygrometers**
- **Thermohygrometers**
- **Dataloggers (Temperature/Humidity)**

Humidity calibration range of 25 %rh to 75 %rh and a temperature calibration range of 15 °C to 35 °C.


**Calibrations are carried out in a Thunder Scientific 2500 Humidity Generator. Measurement readings of the test instruments are compared against the readings of a reference thermohygrometer.**

# Measurement Assistance Services

We provide a range of measurement-related services which includes:

- Assisting in the purchasing of instruments to meet your needs.
- Providing measurement solutions for operational problems.
- Assisting in evaluating measurement services for contractual arrangements.

If you have a query concerning a measurement device or process you are using, or you want to implement a new measurement approach, please do not hesitate to contact us at the TTBS Metrology Division.

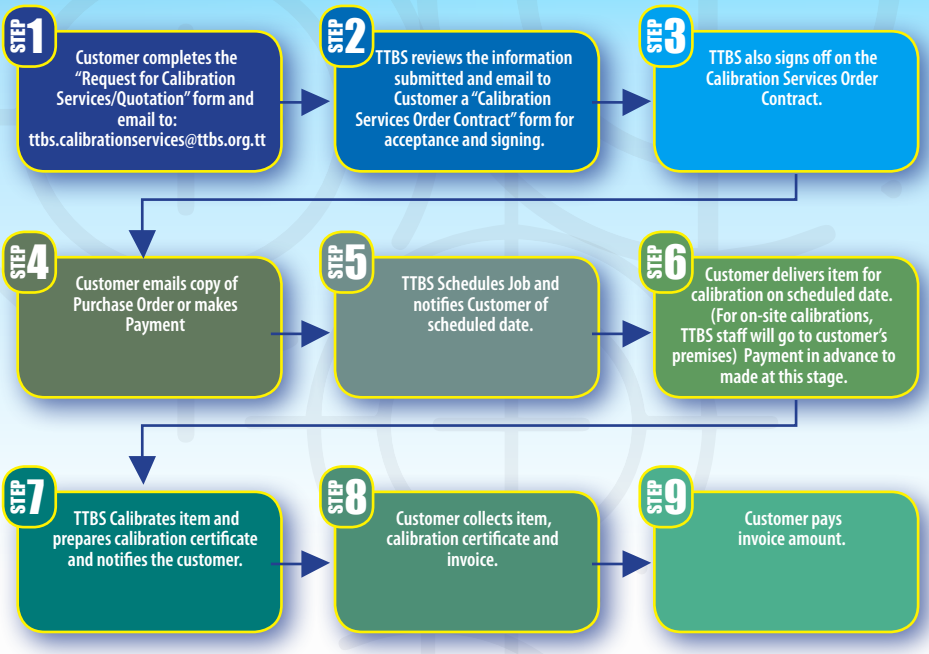
We welcome the opportunity to help you succeed.

We also provide general metrology and measurement training or we can customize a training programme to meet your specific measurement needs.

Some of the training programmes we conduct are:

- **General Metrology**
  **(a pre-requisite to be done prior to any other training)**
- **Dimensional Calibration**
- **Pressure Calibration**
- **Torque Calibration**
- **Weighing Instrument Calibration**
- **Measurement Uncertainty**

# How to Request Calibration Services




***NOTE: No job will be scheduled without a purchase order (for credit customers) or payment in advance.***

**Phone:**
662-8827 (Ext. 2305, 2307)

**Email:**
ttbs.calibrationservices@ttbs.org.tt

TRINIDAD AND TOBAGO
BUREAU OF STANDARDS

METROLOGY DIVISION
**CALIBRATION SERVICES UNIT**

**For further information contact a metrology representative today**

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