

Why is metrological traceability Important?

- Metrological traceability is important because it gives you confidence and assurance that your measurement results are 'right'.
- The results can be used to provide calibrations, perform tests, or make conformity assessment decisions that affect operability, reliability and regulatory compliance.

The work that you perform in the laboratory can significantly impact society.



Metrological traceability...

is the primary tool that enables us

...to get the measurements right

We have to get the message out at the highest level: policy makers, regulators...

BIPM, OIML, ILAC, ISO

joint declaration



'We encourage our Members, as well as others for whom metrological traceability is important, to adopt the recommendations...'

We also encourage other bodies to declare their support for the principles and practices embodied in this declaration wherever possible.'

BIPM: [https://www.bipm.org/utils/common/pdf/BIPM-OIML-ILAC-ISO joint declaration 2018.pdf](https://www.bipm.org/utils/common/pdf/BIPM-OIML-ILAC-ISO_joint_declaration_2018.pdf)

ILAC: <https://ilac.org/about-ilac/partnerships/international-partners/bipm/>

Recommendation

3. Recommendation

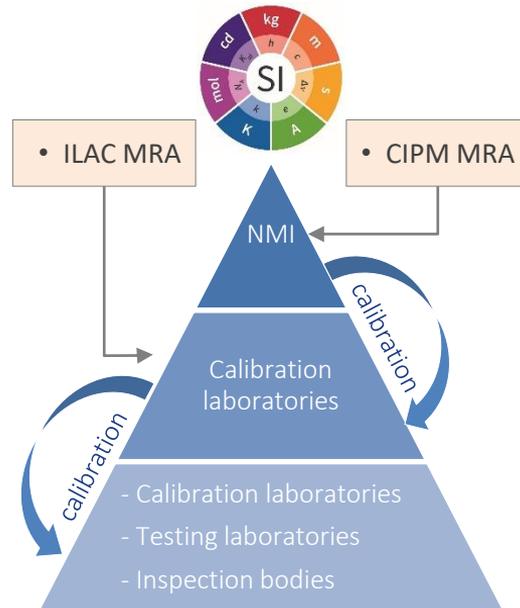
The BIPM, OIML, ILAC, and ISO endorse the following recommendations:

- In order to be able to rely on their international acceptability, calibrations should be performed
 - in National Metrology Institutes which should normally be signatories to the CIPM MRA³ and have CMCs⁴ published in the relevant areas of the KCDB⁵ or
 - in laboratories accredited to ISO/IEC 17025 by accreditation bodies that are signatories to the ILAC Arrangement⁶;
- measurement uncertainty should follow the principles established in the GUM⁹;
- the results of the measurements made in accredited laboratories should be traceable to the SI⁷;
- NMIs providing metrological traceability for accredited laboratories should normally be signatories to the CIPM MRA and have CMCs published in the relevant areas of the KCDB;
- within the OIML-CS⁸, accreditation should be provided by bodies which are signatories to the ILAC Arrangement and the above policies on metrological traceability to the SI should be followed.

The above principles should be used whenever there is a need to demonstrate metrological traceability for international acceptability.

In detail: calibrations

- ✓ In order to be able to rely on their **international acceptability**, calibrations should be performed:



- in laboratories accredited to ISO/IEC 17025 by accreditation bodies that are signatories to the ILAC MRA

- in NMI which should normally be signatories to the CIPM MRA and have CMCs published in the relevant areas of the KCDB

Measurement uncertainty

...follow principles established in the GUM

Measurements

...should be metrologically traceable to the SI

International acceptability

ISO/IEC 17025

A.3 Demonstrating metrological traceability

A.3.1 Laboratories are responsible for establishing metrological traceability in accordance with this document. Calibration results from laboratories conforming to this document provide metrological

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traceability. Certified values of certified reference materials from reference material producers conforming to ISO 17034 provide metrological traceability. There are various ways to demonstrate conformity with this document: third party recognition (such as an accreditation body), external assessment by customers or self-assessment. Internationally accepted paths include, but are not limited to, the following.

- a) Calibration and measurement capabilities provided by national metrology institutes and designated institutes that have been subject to suitable peer-review processes. Such peer-review is conducted under the CIPM MRA (International Committee for Weights and Measures Mutual Recognition Arrangement). Services covered by the CIPM MRA can be viewed in Appendix C of the BIPM KCDB (International Bureau of Weights and Measures Key Comparison Database) which details the range and measurement uncertainty for each listed service.
- b) Calibration and measurement capabilities that have been accredited by an accreditation body subject to the ILAC (International Laboratory Accreditation Cooperation) Arrangement or to Regional Arrangements recognized by ILAC have demonstrated metrological traceability. Scopes of accredited laboratories are publicly available from their respective accreditation bodies.

Reliable path for demonstration of metrological traceability

...for example



European Aviation Safety Agency

User Guide

Foreign Part 145 approval
Tools and Equipment

Doc # UG.CAO.00132-001
Approval Date 14/12/2015

10.2. Tooling calibration

10.2.1. Definitions

The International Bureau of Weights and Measurements is a recognized authority that maintains a list of National Metrology Institutes (NMI). The BIPM web site lists the NMI signatory countries that participate in the International Committee on Weights and Measurements (CIPM¹²). CIPM and ILAC work in close cooperation, as formalised by the signature of a Memorandum of understanding, stating that “The CIPM MRA and ILAC MRA are complementary. Their combination helps to provide confidence in the consistency of System of Units traceable measurements worldwide”.

NMI and accredited laboratory services are acceptable for aviation safety

...for example,

Arrangements to facilitate CAP

(encouraged in TBT Agreement)

The value of documentary standards and accreditation is directly recognised

The value of the NMI is indirectly recognised

- International or regional systems for conformity assessment
 - “Members shall, wherever practicable, formulate and adopt international systems for conformity assessment”
 - Systems such as ILAC/IAF, IECEE CB are increasingly prominent in TBT Committee discussions
- Recognition of foreign conformity assessment results
 - “verified compliance, for instance through **accreditation**, with relevant guides or recommendations issued by international standardizing bodies shall be taken into account as an indication of adequate technical competence”

Courtesy
L Locks WTO



Common view...

All four organizations collaborate, with other international stakeholders, in the Joint Committee for Guides in Metrology, (JCGM) responsible for developing common documents.

→ Member organizations:



Common view...

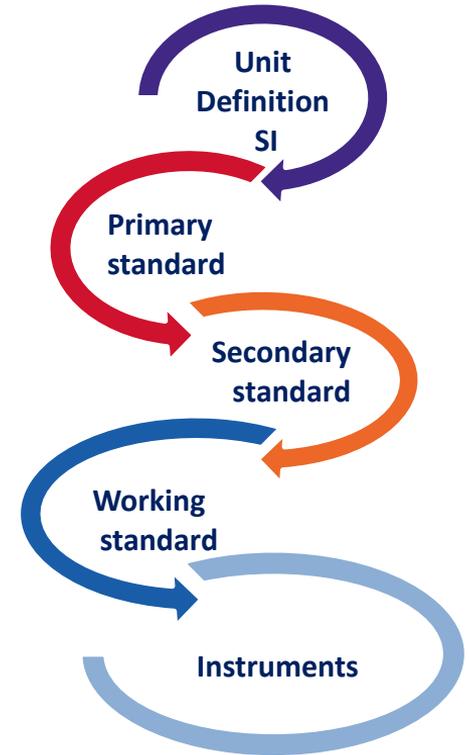
JCGM issues two documents key to the Joint Declaration are:

- Uncertainty in Measurement - Part 3 - Guide to the Expression of Uncertainty in Measurement (GUM) – JCGM 100, (and related OIML G 1-100 and ISO/IEC Guide 98-3) promote a consistent and common approach to the evaluation of measurement uncertainty in a variety of metrological situations; and
- International vocabulary of metrology - Basic and general concepts and associated terms (VIM) – JCGM 200, (and related OIML V 2-200 and ISO/IEC Guide 99).

In particular,

The VIM defines metrological traceability as:

“property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty”.



Use of declaration

4. Use of this Declaration

These principles underpin a worldwide measurement system which provides a robust, internationally accepted framework within which users can have confidence in the validity and acceptability of measurement results. The parties strongly encourage legislators and regulators to refer to the CIPM Mutual Recognition Arrangement, the ILAC Mutual Recognition Arrangement, and the OIML Certification System and to accept measurement results made within them, thereby helping avoid technical barriers to trade. We also invite other interested parties to endorse these principles and to make use of them in their own work.

Conclusion

- BIPM, OIML, ILAC and ISO assert that international consistency and comparability of measurements are required to achieve the missions of their Organizations.
- The international consistency and comparability can only be guaranteed if measurement results are metrologically traceable to internationally recognized references.
- All four bodies collaborate, with other international stakeholders, in the JCGM which issues two important documents, VIM and GUM.
- This framework enables legislators, regulators and exporters/importers to take advantage of an international set of mutually supportive systems, which demonstrate equivalence of measurements.

Thank you

