

BIPM-SIM Training course: KCDB 2.0

CIPM MRA overview

Bureau
International des
Poids et
Mesures

20th April 2022
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BIPM

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/documents/20126/42177518/cipm-ilac_joint_statement-2020.pdf/c10a3197-e4f1-6162-3691-23eaca22b098

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

01 – CIPM MRA is a secure technical foundation

CIPM MRA *today* - a secure technical foundation for wider agreements



Objectives:

- to establish the *degree of equivalence* of national measurement standards maintained by NMIs
- to provide for the mutual recognition of *calibration and measurement certificates* issued by NMIs
- thereby to provide governments and other parties with *a secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs*

Today, the CIPM MRA provides *a primary source to identify internationally recognized national capabilities* within the NMI and wider metrology community. The underpinning science and the outcomes are openly available to all interested parties...

The CIPM MRA signatories are acceptable to the Federal Aviation Administration

Safety Assurance System: Inspect a Part 145 Repair Station's Tools and Equipment

B. Review Calibration/Record. Review the part of the RSM or QCM describing the system and the procedures used for calibrating MTE.

1) The ASI should verify:

a) The repair station is calibrating MTE per intervals, procedures, and the system described in the RSM or QCM.

b) All MTE are calibrated and traceable to a standard acceptable to the Federal Aviation Administration (FAA), to include those recommended by the manufacturer, and the National Institute of Standards and Technology (NIST) or other national authority.

NOTE: The part 145 rule states that tooling used to make airworthiness determinations must be calibrated to a standard acceptable to the FAA. Those standards may be derived from the NIST, to a standard provided by the equipment manufacturer, or other recognized standards. The International Bureau of Weights and Measures (BIPM) is a recognized authority that maintains a global list of National Metrology Institutes (NMI). The BIPM Web site lists the NMI signatory countries that participate in the International Committee for Weights and Measures (CIPM). The CIPM Mutual Recognition Arrangement (MRA) signatories are acceptable to the FAA and can be found at <http://www.bipm.org>. There are many accreditation bodies that provide third-party laboratory accreditation. The International Laboratory Accreditation Cooperation (ILAC) establishes a global network for accreditation of laboratory and testing facilities. Signatories to the ILAC MRA are in full conformance with the standards of International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 17011. ILAC MRA signatories are acceptable to the FAA and can be found at <http://www.ilac.org>. Accredited laboratories have already established traceability through the assessment and accreditation process under ISO/IEC 17025. No further documentation is required once traceability is confirmed to a recognized accredited laboratory. Additionally, for foreign equipment, the standard of the country of manufacture may be used if acceptable to the Administrator.

...European Aviation Safety Agency



European Aviation Safety Agency

User Guide

Foreign Part 145 approval

Doc #

UG.CAO.00132-001

Tools and Equipment

Approval Date

14/12/2015

10.2. Tooling calibration

10.2.1. Definitions

BIPM: The International Bureau of Weights and Measurements is a recognized authority that maintains a global 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”.

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*

Assuring data quality for ILAC

ILAC-P10:07/2020

2. ILAC POLICY ON METROLOGICAL TRACEABILITY OF MEASUREMENT RESULTS

When metrological traceability is required, the ILAC policy is that the measuring equipment⁽¹⁾ shall be calibrated by:

Reliable route for metrological traceability

- 1) A National Metrology Institute (NMI) whose service is suitable for the intended use and is covered by the International Committee for Weight and Measures Mutual Recognition Arrangement (CIPM MRA). Services covered by the CIPM MRA can be viewed in the Bureau International des Poids et Mesures Key Comparison Database (BIPM KCDB) which includes CMCs for each listed service.



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02 – Overview

Regional Metrology Organizations



Participation

The CIPM MRA is open to:

- NMIs of the Member States
- certain international and intergovernmental organizations (IGO) invited by the CIPM
- NMIs of Associate States and Economies of the General Conference

Participation (applicable to CARICOM)

In the special case of an Associate comprising several individual states (such as CARICOM, which is a formally recognized economic entity):

- the CIPM MRA should be signed by the relevant Economy as the recognized coordinating body for the CIPM MRA;
- each state of the Economy may have their own CMCs; and
- each state of the Economy would designate their own NMIs or other Designated Institutes.

The Economy would, however, be the channel through which such national designations are notified to the Director of the BIPM

Participation (DIs)

The CIPM MRA introduced the concept of "designated institutes" as responsible for certain national standards and associated services that are not covered by the activities of the "traditional" NMI.

*Designation process is outlined in
the CIPM MRA-P-13*

Nomination of a Designated Institute

Name of State/Economy:

Name of body that has the authority to designate:

Name of the institute to be designated (DI):

DI legal entity:
(if different from above)

DI Acronym: DI website:

DI mailing address:

Post code: City: Tel/Fax:

Contact Person at DI:

Contact Person's e-mail:

Metrology area of designation*:

Note that within the meaning of the CIPM MRA only one Institute per State or Economy can be designated for any given metrology area**

We confirm that we have the authority to designate within the meaning of the CIPM MRA and this designation is compatible with the spirit, rights and obligations of the CIPM MRA and with document CIPM MRA-P-13. Furthermore, we confirm that the organization being designated understands and accepts the rights and obligations of designation.

Your name and position within the designating body:

Signature: Date:

Please return to:
BIPM Pavillon de Breteuil
F-92312 Sèvres Cedex, France
e-mail: jcrb_es@bipm.org

***Chemistry, photometry, force, flow, volume, radioactivity, etc.**

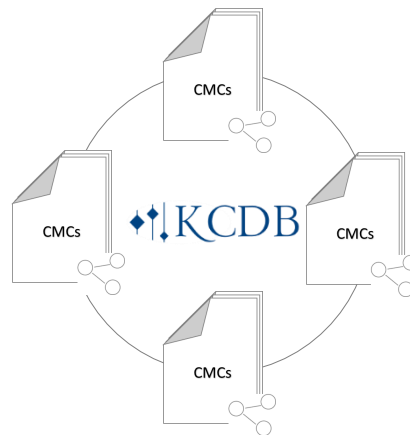
**The metrological responsibilities of signatory NMIs and other DI of the same State or Economy must always be clearly differentiated. If within a State the signatory NMI and a DI both have responsibilities within the same metrology area, the designation scope must be specified in sufficient detail to distinguish their responsibilities. This should be done using the classification of services as available on the KCDB: <https://www.bipm.org/kcdb/>

NOTE 1 Starting date of participation in the CIPM MRA will be considered as the date when the BIPM receives the signed designation form and it is this date that the BIPM will display.

Engagement

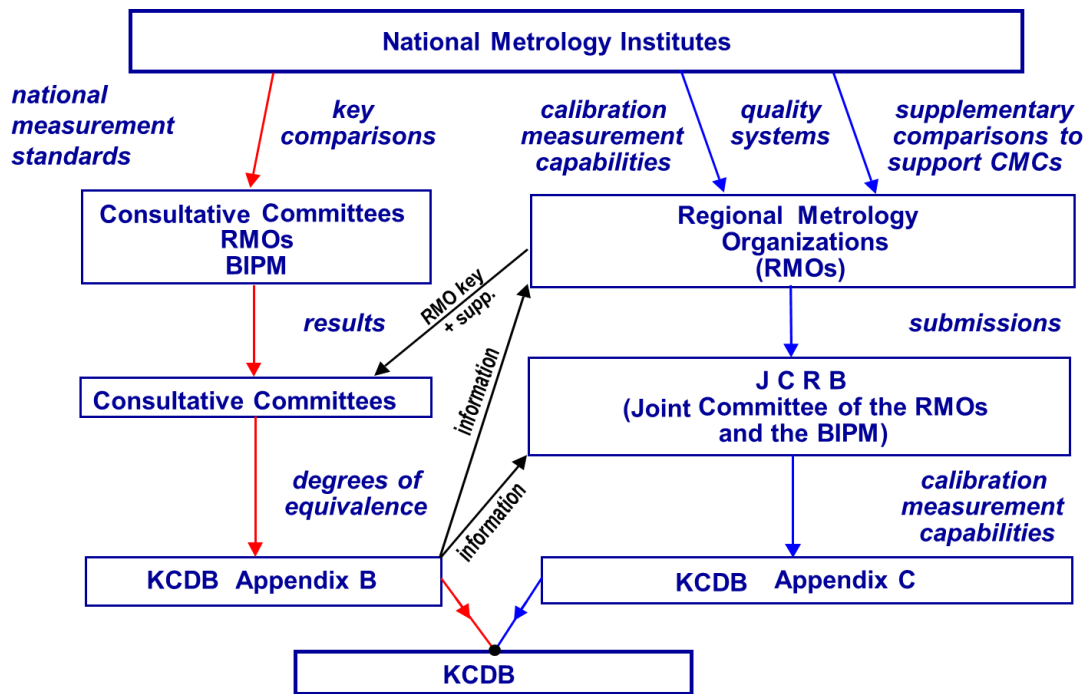
By signing the CIPM MRA, an NMI agrees to:

- accept the process specified in the CIPM MRA for establishing the database
- recognize the results of key and supplementary comparisons as stated in the database
- recognize the calibration and measurement capabilities of other participating NMIs as stated in the database



CIPM MRA processes

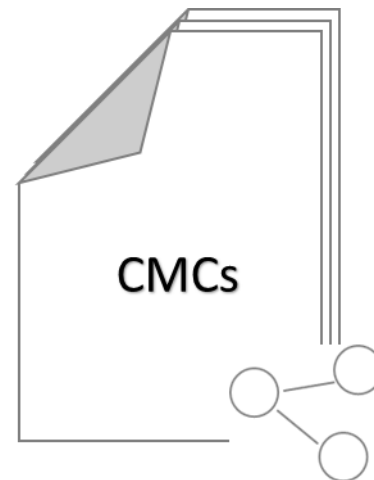
*CIPM Consultative Committee
WGs play a vital role ensuring
consistent and technically
valid application*



CMCs – outcomes of the CIPM MRA

The outcomes of the CIPM MRA are the internationally recognized (peer-reviewed and approved) **Calibration and Measurement Capabilities (CMCs)** of the NMIs declared on the publicly available BIPM key comparison database (KCDB).

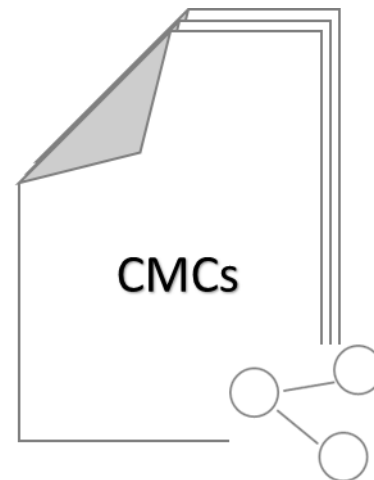
These CMCs declared by NMIs form the top of the metrological traceability chain that supports, amongst others, the 80 000+ accredited calibration and testing laboratories worldwide.



Services covered by CMCs

In context of the CIPM MRA calibration and measurement capabilities underpin:

- calibrations and measurements delivered by NMIs in accordance with the requirements of the ISO/IEC 17025:2017
- certified reference materials (CRMs) that are produced by NMIs according to ISO 17034:2016.



CIPM MRA documents

CIPM MRA

POLICY DOCUMENTS

CIPM MRA-P-11

Overview and implementation of the CIPM MRA

CIPM MRA-P-12

Coordination within the CIPM MRA:
Consultative Committees, Regional Metrology
Organizations, JCRB

CIPM MRA-P-13

Participation in the CIPM MRA:
National Metrology Institutes, Designated Institutes,
International organizations

GUIDELINE DOCUMENTS

CIPM MRA-G-11

Measurement comparisons in the CIPM MRA:
Guidelines for organizing, participating and
reporting

CIPM MRA-G-12

Quality management systems in the CIPM MRA:
Guidelines for monitoring and reporting

CIPM MRA-G-13

CMCs in the context of the CIPM MRA:
Guidelines for their review, acceptance and
maintenance

RELATED COLLABORATIVE STATEMENTS and DECLARATIONS

Joint ILAC-CIPM communication regarding the
accreditation of calibration and measurement
services of national metrology institutes

Joint BIPM, OIML, ILAC and ISO declaration on
metrological traceability

Common statement and declaration by the
BIPM, OIML and ILAC on the relevance of
various international agreements on metrology
to trade, legislation and standardization

Conclusion

- CIPM MRA is a secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs.
- Harmonizes worldwide recognition of the realisations of the SI units and measurement standards.
- Ensures the mutual confidence through peer reviewed systems (quality and CMCs), underpinned by measurement comparisons.
- Reliable route for metrological traceability.

Thank you

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