



**Bureau International des Poids et Mesures**



## **Requirements of the CIPM MRA**

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FGNMID CIPM MRA Workshop  
Skopje, April 27-29, 2011



## Outline

- Becoming a Member of the BIPM or Associate to the CGPM
- Signing the CIPM MRA
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- Calibration and Measurement Capabilities



## Members and Associates

In order to sign the CIPM MRA, an NMI must first be either a **Member of the BIPM** or an **Associate to the CGPM**.

States wishing to become a Member of the BIPM, must inform the French Foreign Minister of its intent by letter delivered through its embassy in Paris

States wishing to become an Associate to the CGPM, must apply directly to the Director of the BIPM through an authorized government official or its embassy in Paris.

# Members and Associates

## Member States:

- Voting rights in the CGPM
- May participate in CCs
- May take part in CC comparisons and contribute to the KCRV
- May take part in BIPM key comparison
- Entitled to Pt-Ir kg prototype at cost
- Free BIPM calibrations
- Staff may be guest workers at BIPM
- May attend Directors' Meeting

## Associates of the CGPM:

- May attend CGPM as an observer
- NMIs may be guests of CCs upon invitation
- NMIs may sign the CIPM
- May take part in RMO key comparisons and supplementary comparisons
- Staff may be guest workers at the BIPM
- May attend Directors' meetings



## Signing the CIPM MRA

The CIPM MRA is signed by the director of the NMI or a ‘coordinating’ body authorized by the government of the country.

Only one institute may sign the CIPM MRA on behalf of a Member State or Associate of the CGPM. When there are other institutes that have been designated to hold national measurement standards (“designated institutes”), the institution that has signed the CIPM MRA on behalf of the member or associate must notify the BIPM.



## Responsibilities of the Signing Institution

The signatory of the CIPM MRA is the coordinating organization for the country and takes responsibility for establishing the appropriate mechanism so that the CMCs of designated institutes do not overlap with others designated at a national level and that they follow the process of approval established by the JCRB.

Only one institute per country can be recognized as holding national responsibility for a specified capability and competence, for submitting the related CMCs and for taking part in the relevant key comparisons.



## NMIs and RMOs

According to the CIPM MRA:

“Those NMIs that wish to participate in this arrangement but are not members of an RMO, should either form a new RMO, or for the purposes of this arrangement, associate themselves with an existing RMO, whichever is the most appropriate.”

So,

**All NMIs taking part in the CIPM MRA must go through an RMO** in order to take part in the activities – key and supplementary comparisons, and CMC declaration – required by the arrangement.

## Obligations of the CIPM MRA Signatory

From the moment that the CIPM MRA is signed, the signatory:

- **accepts the process** specified in the CIPM MRA for establishing the Key Comparison Database;
- **recognizes the results of key and supplementary comparisons** as given in the KCDB;
- **recognizes the CMCs of other participating NMIs** as given in the database.



## Expectations of a CIPM MRA Signatory

Signatories of the CIPM MRA are expected to:

- **Participate in key and supplementary comparisons** in order to establish the equivalence of the measurement standards that they hold and in order to demonstrate their capabilities,
- **Implement a comprehensive Quality System** that is in compliance with ISO 17025:2005 or equivalent and submit information to its RMO for review purposes,
- **Declare their calibration and measurement capabilities (CMCs)** and submit them to the review process.

## Participation in Key and Supplementary Comparisons

Participation in comparisons is the fundamental requirement for having an NMIs measurement standards accepted within the framework of the CIPM MRA.

While CIPM Key Comparisons are open to NMIs having the highest levels of technical capability, generally those that are CC members, all NMIs that have the required technical capability can participate in RMO key and supplemental comparisons.

Results from comparisons are the **ideal supporting evidence** for CMCs

# Quality System Requirements

A quality system (QS) describes the everyday work of an institute in a **standardized** way to ensure the **maintenance** of a certain level of quality and its **continuous improvement**.

A functioning quality system:

- Makes the work of the NMI **transparent**,
- Describes the **working procedures**, needed **personnel competencies** and the **required equipment**,
- Forms the foundation of the **mutual confidence** among NMIs concerning measurement and calibration capabilities.

## Quality System Requirements

The CIPM MRA offers two options for NMIs for establishing a QS as a requirement for the recognition of calibration and measurement certificates:

1. Establishment of a quality system that meets the requirements of ISO/IEC 17025 or equivalent for an NMI that is **assessed by an accreditation body** fulfilling the requirements of ISO/IEC 17011
2. Establishment of a quality system or a different way of assuring quality that meets the requirements of ISO/IEC 17025 or equivalent **without third-party assessment**

## Quality System Requirements

In either case – with or without third-party assessment – all NMIs must have their QS reviewed and approved by the RMO of which they are a member.

Reviews of NMI QS are done according to CIPM MRA-G-02:  
“Guidelines for the monitoring and reporting of the operation of quality systems by RMOs”

RMOs have a degree of flexibility in setting the requirements for the QS of their member NMIs and DIs and their review processes.



## Calibration and Measurement Capabilities

After establishing a functioning QS that receives the approval of their RMO and participating in key and supplemental comparisons according their needs, the NMI is ready to declare their CMCs.

The format for CMC declarations is given in the [templates](#) and document [CIPM MRA-D-04](#) “Calibration and Measurement Capabilities in the context of the CIPM MRA” available on the BIPM website.

## Required Features of a CMC Declaration

There are three characteristics in a CMC declarations that should be unambiguous:

1. **Measurand:** Only one measurand allowed per CMC
2. **Range:** Must never be expressed with reference to other services.
3. **Uncertainty:** There must be no doubt as to the uncertainty that can be expected of a CMC. Four options given for expression: single value, range, explicit function of measurand or parameter, matrix

# Traceability

All CMCs must include information on traceability of the measurements to the SI. According to the BIPM, there are two routes to establish traceability:

1. via a **primary realization** of the unit of measurement concerned, in which traceability is declared to its own demonstrable realization of the SI.

In order for a primary realization or representation of the unit of measurement to be considered valid, it requires the approval of the relevant Consultative Committee.
2. via comparison with one or more realizing relevant CMCs with their results published in the KCDB, or through comparison with the comparison services offered by the BIPM.

The NMI or DI must make available a full assessment of the uncertainty budget and the traceability route for its measurement activity when submitting CMCs for intra- and inter-Regional review.

## Required evidence for CMC declarations

CMC declarations must be backed by **evidence**. Acceptable evidence includes:

1. Results of key and supplementary comparisons
2. Documented results of past CC, RMO or other comparisons (including bilateral)
3. Knowledge of technical activities by other NMIs, including publications
4. On-site peer-assessment reports
5. Active participation in RMO projects
6. Other available knowledge and experience



## CMC Review

Once the NMI has prepared its CMC declarations, it submits them to its RMO's TC-Chair in the relevant area for review with accompanying documentation, if necessary.

**Thus begins the two stage review of CMCs.**

Until final approval, the NMI must be prepared to answer questions, and if necessary, modify their submission, in order to satisfy reviewers.



## CIPM MRA Logo



Once an NMI has published CMCs, it can apply to the BIPM Director to use the CIPM MRA logo on its calibration and measurement certificates covered by those CMCs.

*“This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM.*

*Under the MRA, all participating institutes recognize the validity of each other’s calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see <http://www.bipm.org>)”*



**Thank you for your attention!**

**If you have any questions about the requirements and implementation of the CIPM MRA, please contact me at:**

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