



**SIM Reference Document no. 07  
Procedure for Registration and Disposition of SIM Comparisons**

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**OBJECTIVE AND SCOPE**

**Objective**

In the context of the CIPM MRA, the set of results obtained through key and supplementary comparisons carried out (and published, if duly registered, in Appendix B of the Key Comparison Database, [https://kcdb.bipm.org/AppendixB/KCDB\\_ApB\\_search.asp](https://kcdb.bipm.org/AppendixB/KCDB_ApB_search.asp)) by the regional metrology organizations (RMOs) are crucial in forming the technical basis of the arrangement.<sup>1</sup> The objective of this reference document is to describe the steps required to register and follow the progress of comparisons carried out by members of the Interamerican Metrology System (SIM) and, as applicable, documented in the corresponding BIPM database, KCDB.

## Scope

This procedure applies to current and planned multilateral or bilateral, key or supplementary comparisons or pilot studies that have been initiated, organized and reviewed by a SIM Metrology Working Group (MWG). Although previously registering comparisons that provided metrologically relevant information used the same procedure (but only with agreement of the corresponding CC) for results *already* available, this post-comparison registration is to be avoided in SIM.

## DEFINITIONS AND ACRONYMS

### Definitions<sup>1-4</sup>

**BIPM Key comparison database (KCDB):** The database maintained by the BIPM, which contains the Appendices A, B, C and D of the CIPM MRA.

**CMC:** Calibration and Measurement Capability(ies). As defined in the CIPM MRA<sup>5</sup>, a CMC is “calibration and measurement capability available to customers under normal conditions either (a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA or (b) as described in the laboratory’s scope of accreditation granted by a signatory to the ILAC Arrangement.” The SIM procedure for review of CMCs (submitted for Appendix C of the CIPM MRA) is found in SIM Reference Document 05 (SIM-D- 05 current version).

**Comparison:** Measurement, by two or more National Measurement Institutes (NMIs) or their Designated Institutes (DIs), of an artifact, reference material or quantity generated according to a previously established and agreed upon protocol, to assess the comparability or proficiency of the participants, or some other purposed. In this document, a “comparison” may refer to a key or supplementary comparison, or a pilot study. After a key or supplementary comparison (but not a pilot study) is initiated, a participant may change or withdraw their data only on the basis of a clear failure of the artifact or some other phenomenon that renders the comparison or part of it invalid, and with the agreement of all participants.

**Consultative Committees (CC):** Technical groups, consisting of world experts from among the institutions who are party to the Metre Convention, which support the International Committee for Weights and Measures (CIPM) as advisers on scientific and technical matters.

**Draft A:** First draft of the comparison report, prepared as soon as all results have been received from the participants. Draft A includes the results transmitted by the participants, identified by name, and a first calculation of the comparison reference value. Results are not communicated if there are any outliers, until those participants have been contacted to verify that there have been no arithmetic, typographical or transcription errors. There may be several versions of Draft A (Draft A1, A2, etc.) until all participants agree with the report. Draft A and all its versions are considered confidential and may be distributed only among the participants.

**Draft B:** Final revision of Draft A, including the proposed comparison reference value and degrees of equivalence, as approved by the participants. While the reference value and degrees of equivalence are still considered confidential, the individual participant's specific results are no longer confidential and may be used in publication and to support CMCs.

**Final report:** The version of the Draft B report approved by the relevant MWG and published in the KCDB.

**Key comparison:** One of a set of comparisons selected by a consultative or technical committee (such as the MWGs) to test the principal techniques and methods in the field (note that "key" comparisons may include comparisons of representations of multiples and sub-multiples of SI base and derived units and comparisons of artifacts). Key comparisons may be organized by the Consultative Committees (CIPM KC) or by the Regional Metrology Organizations (RMO KC).

**Member:** The institution or organization of each SIM member country responsible for the custody and maintenance of its National Measurement Standards or, in its absence, the organization responsible for the National Weights and Measure System.

**Pilot Laboratory:** An NMI or DI that organizes and controls the logistics of a comparison.

**Pilot study:** Measurement, by two or more NMIs or DIs, of an artifact, common sample or quantity generated according to a previously established and agreed upon protocol, whose main purpose is to provide information to help the participants improve their proficiency and plan future comparisons. The actual names of the participants may, or may not, appear in the final report. It should be noted that any participant may withdraw its data from the report (i.e., Draft A) before the final report (Draft B) for publication.

**Supplementary Comparison:** Comparison carried out by the CCs, the RMOs or the BIPM to meet specific needs not covered by key comparisons, including comparisons to support confidence in calibration and measurement certificates

**SIM Technical Committee:** The collection of MWG chairs, representing the gamut of technical areas in SIM as well as support (e.g., uncertainties, quality) activities in addition to the sub regional representatives.

## Acronyms

BIPM                      International Bureau of Weights and Measures

CC	Consultative Committee of the CIPM
CIPM	International Committee of Weights and Measures
CIPM MRA	Mutual Recognition Arrangement promoted by the CIPM
DI	Designated Institute
KC	Key Comparison
KCDB	BIPM Key Comparison Data Base
JCRB	Joint Committee of the Regional Metrology Organizations and the BIPM
NMI	National Metrology Institute
MWG	SIM Metrology Working Group
SIM	Interamerican Metrology System
TC	SIM Technical Committee

## PROCEDURE

### Registration of a proposed comparison or pilot study

Any NMI, DI, or group of NMIs/DIs within SIM may present a comparison or pilot study (past, current or proposed) for consideration to the appropriate MWG, whether or not it was originally organized by the MWG. This includes sub-regional comparisons or pilot studies and those with the participation of laboratories from other RMOs. The rules for registering such a comparison or pilot study are described below.

### Registration of a current or planned comparison or pilot study in the BIPM KCDB

All current and planned SIM comparisons and pilot studies shall be registered by the MWGs in the BIPM KCDB, and shall be carried out in accordance with the Technical Supplement to the CIPM MRA.

The chair of the MWG shall submit, copying the TC chair, the protocol and any associated documents, provided by the pilot laboratory, to the Executive Secretary of the relevant CC, who shall verify that the information is complete, assign an identification number and enter it in the BIPM KCDB. MWGs should submit the results of pilot studies to the Executive Secretary of the relevant CC for recording purposes.

Comparisons or pilot studies organized at a sub-regional level, without the participation of the MWG, may be included in the BIPM KCDB if the participants wish to do so, as long as they meet the requirements of this procedure and registration occurs before the comparison is completed. For this purpose, the organizing (pilot) NMI shall present the protocol for consideration to the corresponding MWG. The chair will then follow the normal submission procedure, described above.

## Acceptance of a SIM comparison as a comparison of the CC

Designation of a comparison as a CC key (or supplementary) comparison is approved by the corresponding CC. Upon request by the comparison Pilot Laboratory, the chair of the MWG will forward requests for registration of comparisons to the relevant CC, but it remains the responsibility of the CC to deem acceptance as a CC key (or supplementary) comparison.

## TRACKING COMPARISONS

As a comparison is carried out, the comparison Pilot Laboratory should keep the MWG chair apprised of progress and informed of any difficulties. As progress is made during a registered comparison, updates should be made to the BIPM KCDB through submission of a revised protocol, by the MWG chair to the Executive Secretary of the relevant CC, with a copy sent to the chair of the TC.

## COMPLETED COMPARISONS

Once an SIM comparison is completed, a report is generated by the Pilot Laboratory and agreed upon by all participants (“Draft A”), according to the Technical Supplement to the CIPM MRA ([http://www.bipm.org/utis/en/pdf/mra\\_techsuppl2003.pdf](http://www.bipm.org/utis/en/pdf/mra_techsuppl2003.pdf)). After the participants agree on the Draft A, it is then submitted to the MWG for examination and approval (“Draft B”).

The MWG produces an executive summary with recommendations it deems appropriate, including a comment as to whether the participants should modify their CMC claims to remain consistent with the comparison results. The MWG must judge if an outlier outcome is significant or whether there is other evidence that could support an existing claim.

This information is submitted by the chair of the MWG to the Executive Secretary of the relevant CC (with a copy to the chair of the TC) for registration in the BIPM KCDB.

## RESULTS

The expected results of the application of this procedure are:

- Measurement results from comparisons or pilot studies registered in the BIPM databases
- A list of past, current and planned comparisons and pilot studies in SIM are registered in the BIPM databases
- Points of contact for piloting comparisons are recorded
- Updates on the progress of on-going comparisons are available immediately

## RESPONSIBILITIES

### Members of the MWG:

- Participate in relevant comparisons
- Analyze the results of comparisons, approve the final reports and decide on suitability for inclusion in the BIPM KCDB
- Approve future comparisons and/or pilot studies
- Pilot relevant comparisons, including sharing the piloting responsibilities (e.g., one lab writes the protocol, another writes the report), in order to distribute effort and also to gain experience

### Chairs of MWGs:

- Notify the chair of the TC the decision of the MWG to register the results of comparisons in the BIPM KCDB.
- Submit reports of pilot studies to the chair of the TC and the Executive Secretary of the relevant CC.
- Notify the chair of the TC the information for all current and planned comparisons and pilot studies
- Request updates on comparison progress from the pilot to send to the Executive Secretary of the relevant CC, copying the TC chair, to be submitted to the BIPM KCDB.
- Submit annually a program of planned comparisons to the chair of the TC, in order to be presented to the Council, which may propose mechanisms for possible avenues of financial support (e.g., to acquire artifacts to be used in the comparison).
- Request acceptance of current and planned comparisons in the BIPM KCDB from the respective CC, copying the chair of the TC and members of the relevant MWG on all pertinent communications.
- Notify corresponding technical working group chairs in other RMOs of planned comparisons that can accept additional participants, as needed.

### Chair of the TC:

- Supervise the MWG processes to verify, as needed, that they follow the described procedures.

### Technical Committee:

- Consider the acceptance or rejection of a SIM comparison or pilot study, if requested to do so by the chair of an MWG.

- Develop and approve procedures for SIM activities related to comparisons as needed and to be presented to the SIM Council.

## REFERENCES

1. CIPM MRA-D-05 (“Measurement comparisons in the context of the CIPM MRA”) Version 1.3 October 2012 ([http://www.bipm.org/utils/common/CIPM\\_MRA/CIPM\\_MRA-D-05.pdf](http://www.bipm.org/utils/common/CIPM_MRA/CIPM_MRA-D-05.pdf))
2. “International vocabulary of metrology – Basic and general concepts and associated terms (VIM),” 3<sup>rd</sup> edition 2008 version with minor corrections ([http://www.bipm.org/utils/common/documents/jcgm/JCGM\\_200\\_2012.pdf](http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2012.pdf))
3. SIM Statute V2, approved in Miami, USA, December 2001.
4. Mutual recognition of national measurement standards and of calibration and measurement certificates issued by national metrology institutes, Comité international des poids et mesures, Paris, 14 October 1999
5. CIPM MRA-D-04 (“Calibration and Measurement Capabilities in the context of the CIPM MRA”) Version 5 March 2017 ([http://www.bipm.org/utils/common/CIPM\\_MRA/CIPM\\_MRA-D-04.pdf](http://www.bipm.org/utils/common/CIPM_MRA/CIPM_MRA-D-04.pdf))

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1.0	September 2016	Original document
2.0	April 2019	First full revision submitted to SIM Council for acceptance