

CCEM Guidelines on Technical Evidence for the Acceptance of Calibration and Measurement Capabilities in the context of the CIPM MRA

Version 3.2 (March 2023)

1. Scope

This document aims to provide clarification to the criteria for acceptance of Calibration and Measurement Capabilities (CMCs) contained in the document *CIPM MRA-G-13 Calibration and Measurement Capabilities in the context of the CIPM MRA* [1]. It is applicable to the review of CMCs proposed by an NMI or DI in the area of Electricity and Magnetism.

2. Background

CIPM MRA-G-13 calls for intra-regional and inter-regional review of CMCs and lists, in Section 3, the requirement that the range and uncertainty of the CMCs submitted be consistent with information from some or all of the following sources:

1. Results of key and supplementary comparisons;
2. Publicly available information on technical activities including publications;
3. On-site peer-assessment reports, including those from accreditation assessment with appropriate technical peers;
4. Active participation in RMO projects;
5. Other evidence of knowledge and experience, as agreed by the appropriate Consultative Committee.

The document further states that, “while the results of key and supplementary comparisons are the ideal supporting evidence, all other sources listed above may be considered to underpin CMCs. Consultative Committees are responsible for providing specific guidance on the required technical evidence.”

This document provides further guidance on how to apply the above criteria in Electricity and Magnetism. It is aimed at improving the uniformity of CMC acceptance decisions made by intra-regional and inter-regional review of CMCs.

3. Technical evidence required for acceptance of CMCs

The minimum requirement of the CIPM MRA for any CMC is the availability of a quality system document that provides a thorough technical description of the measurement setup and its verification, with a complete uncertainty budget.

The ideal technical evidence required by the CIPM MRA in support of CMCs is the result of a key or supplementary comparison. The CMCs presently recorded in the KCDB for Electricity and Magnetism form the second largest set after Chemistry. CCEM acknowledges that it is not feasible to directly cover every single CMC with a comparison result. Therefore, the following technical evidence is recommended:

- For CMCs covering quantities and ranges for which CCEM has identified, in its Strategic Plan [3], the need for a key comparison, the laboratory must participate in a BIPM, CCEM or RMO key comparison to keep its CMCs or obtain a new CMC.

- NMIs and DIs are expected to participate in RMO supplementary comparisons where these can support one or more of their existing or new CMCs.
- Results of a less formal comparison, for example a hybrid comparison, may be acceptable in lieu of a key or supplementary comparison if a peer reviewer considers them to have sufficient technical rigour and transparency.

In other cases, CMCs can, alternatively, be supported by one or more sources of technical evidence listed in the table below:

Source of technical evidence	Minimum requirement
Publicly available information on technical activities including publications	One or more peer reviewed scientific publications in a high-quality journal (for new state-of-the-art CMCs).
On-site peer-assessment reports, including those from accreditation assessment with appropriate technical peers	On-site peer assessment must comply with the requirements of CIPM MRA-G-12 [2]. The assessor must witness a demonstration of representative measurement and study the relevant technical records, such as method validation, uncertainty analysis, technical publications, RMO project reports, etc. The report of the peer review must cover the CMCs under consideration.
Active participation in RMO projects (and other technical projects)	Successful participation in an RMO project, e.g. a pilot study (comparison project) or research project. The outcome should be documented in a report, which has been reviewed and approved by the RMO and which is publicly available on the RMO website. Technical report written as part of a scientific or innovation project. The report should be reviewed and approved by the project consortium and reviewed by the RMO.

References:

- [1] CIPM MRA-G-13 Calibration and Measurement Capabilities in the context of the CIPM MRA. Guidelines for their review, acceptance and maintenance <https://www.bipm.org/utis/common/documents/CIPM-MRA/CIPM-MRA-G-13.pdf>
- [2] CIPM MRA-G-12 Quality management systems in the CIPM MRA Guidelines for monitoring and reporting <https://www.bipm.org/utis/common/documents/CIPM-MRA/CIPM-MRA-G-12.pdf>
- [3] CCEM strategic plan <https://www.bipm.org/utis/en/pdf/CCEM-strategy-document.pdf>
- [4] CLASSIFICATION OF SERVICES IN ELECTRICITY AND MAGNETISM https://kcdb.bipm.org/appendixC/EM/EM_services.pdf