

Primer for TC/WG Chairpersons on the CMC Review Process¹

1. Introduction

The [CIPM MRA](#)² was drawn up with the following 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.

The process through which the MRA achieves these objectives involves:

- international comparisons of measurements, to be known as key comparisons;
- supplementary international comparisons of measurements;
- quality systems and demonstrations of competence by NMIs.

The outcome of this process is statements of the measurement capabilities of each NMI, which are published in the BIPM key comparison database ([KCDB](#))³, maintained by the BIPM and publicly available on the Web. This database contains four sections corresponding to the four Appendices of the CIPM MRA:

Appendix A: List of NMIs and designated institutes participating in the MRA

Appendix B: Information on key and supplementary comparisons, including results when they become available

Appendix C: Calibration and Measurement Capabilities (CMCs)

Appendix D: List of key comparisons

In order for CMCs to be approved for publication in Appendix C, they must first be reviewed and approved by the appropriate Technical Committee/Working Group⁴ within the RMO through which the NMI submits its CMCs. Once this approval is obtained, CMCs undergo an inter-regional review, where TC/WGs from other RMOs verify that the [Criteria for acceptance of data for Appendix C](#)⁵ have been followed, thus providing the technical confidence required for publication.

¹ See the Glossary at the end of this document

² <http://www.bipm.org/en/convention/mra/>

³ <http://kcdb.bipm.org/> or <http://www.bipm.org/kcdb>

⁴ Groups of technical experts in each area are called “Technical Committees” in APMP, COOMET and EUROMET, and “Working Groups” in SADC MET and SIM.

⁵ http://www.bipm.org/utis/common/documents/jcrb/AppC_criteria.pdf

TC/WGs play a key role in this process as they conduct the technical review and eventual approval of each CMC submission. This document explains the steps TC/WG Chairpersons need to follow in order to carry out this process.

2. General rules for accepting CMCs

Technical support for the arrangement, as stated in Section 3 of the MRA, is achieved mainly through the results of key and supplementary comparisons. Confidence in measurements is further obtained by the presence of some means of assuring quality, as indicated in the MRA Section 7.3.

Key comparisons are designed to provide evidence on the proficiency of NMIs in the **principal techniques** in each field. They are selected, conducted and evaluated by the CIPM Consultative Committees (CCs). Supplementary comparisons are undertaken independently by RMOs when CMCs require additional support not provided by key comparisons.

While it is important that each CMC submission is supported by some comparison evidence, **it is not the intention of the MRA to have a one-to-one correspondence between CMCs and comparisons**. A key or a supplementary comparison may provide enough evidence to underpin the uncertainty claims of a group of related CMCs. How broad this group should be is an issue being considered by the CCs on a continuing basis (see CCWG on CMCs below).

In addition to comparison results, the [Criteria for acceptance of data for Appendix C](#), mentioned above, lists a number of different possible sources of information that can be used to support CMC claims.

3. The CMC Review Process

Drawing up CMC Excel files

All approved CMCs are sent to the BIPM for publication in the KCDB. It is required that all CMC information should be submitted in a consistent format. Detailed instructions on how to draw up these files can be found in the JCRB web page. To download a zip file with documentation related to this topic, click on the link labelled “Instructions for drawing up CMC excel files” in the section on “Guidance on CMC reviews” at: <http://www.bipm.org/en/committees/jc/jcrb/documents.html>⁶

Intra regional reviews

RMOs define their own procedures to carry out intra regional CMC reviews. Once the CMCs are approved at the regional level, the TC/WG Chairperson sends them to the RMO representative, who in turn submits them to the JCRB for inter-regional review

⁶ Please note that the coordinator of the KCDB, Dr. Claudine Thomas (BIPM.KCDB@bipm.org), is available to give advice on the preparation of Excel files

Inter regional review

The inter regional review procedure is explained in document JCRB-7/1 [JCRB Rules of Procedure for CMC entry into Appendix C](#)⁷, which is presented in flowchart form in document JCRB-8/20_rev [JCRB CMC Review Process](#)

Each CMC submission is given a name according the following convention:

RMO.AREA.SEQ_NUM.YEAR

where,

RMO: APMP, COOMET, EUROMET, SADC MET or SIM

AREA: AUV: Acoustics, ultrasound and vibration
EM: Electricity and magnetism
L: Length
M: Mass and related quantities, including mass standards, density, force and torque, pressure, fluid flow, viscosity, hardness and gravity
PR: Photometry and radiometry
QM: Amount of substance (Chemistry)
RI: Ionising radiation
T: Thermometry
TF: Time and frequency

SEQ_NUM: Submission number. A sequence is started for each RMO and each area from the beginning of the MRA (not restarted every year).

YEAR Year of submission to the JCRB

The CMC review process is carried out through the password-protected web page www.bipm.org/JCRB⁸. Technical contacts in each RMO can obtain a username and a password from the JCRB Executive Secretary (use the contact form, in <http://www.bipm.org/en/committees/jc/jcrb/>) or from their RMO representatives to the JCRB.

The ability to download the CMC files from this page helps identify the correct version when several are produced after circulation of comments. Once the files are posted for review, the corresponding technical contacts in each area get in touch directly with each other to exchange comments or concerns (see CC Working Groups on CMCs below). Contact data for all TC/WG Chairs is available in the BIPM web page, under [JCRB Directory](#)⁹

At the end of this phase, reviewing RMOs send their comments to the JCRB Chairman through their JCRB representatives. The JCRB Chairman, in turn, sends them to the representative of the RMO submitting the CMCs under review. These actions are noted in the website with dates.

⁷ http://www.bipm.org/utills/common/documents/jcrb/rules_of_procedure.pdf

⁸ This address needs to be typed as it is not accessible from the BIPM web page. Do not confuse this with the JCRB section of the BIPM site, <http://www.bipm.org/en/committees/jc/jcrb/>, which is not designed for CMC reviews.

⁹ http://www.bipm.org/utills/en/pdf/contact_details.pdf

In response to these comments, the originating RMO sends a final file which is posted in the web page for approval. Reviewing RMO representatives and technical contacts may download the file to verify that their comments and concerns have been appropriately addressed. When all reviewing RMOs have indicated their approval of the posted files, they are published in the KCDB.

Guests can view this page using the following information:

Username: guest

Password: guest2001

CC Working Groups on CMCs

In October 2003, the CIPM approved the creation of “Working Groups on CMCs” at each Consultative Committee, with the following objectives¹⁰:

- a) To establish and maintain lists of service categories, and where necessary rules for the preparation of CMC entries;
- b) To agree on detailed technical review criteria;
- c) To coordinate and where possible conduct inter-regional reviews of CMCs submitted by RMOs for posting in Appendix C of MRA;
- d) To provide guidance on the range of CMCs supported by particular key and supplementary comparisons;
- e) To identify areas where additional key and supplementary comparisons are needed;
- f) To coordinate the review of existing CMCs in the context of new results of key and supplementary comparisons.

These WGs should include representation from all RMOs that have NMIs active in the relevant technical area. WG membership is expected to come from the relevant RMO committees involved in CMC reviews; appropriate experts being chosen depending upon the particular field under review.

TC/WG Chairs who require information on these Working Groups should contact the Executive Secretary of the relevant Consultative Committee, using the contact form in <http://www.bipm.org/en/committees/>.

¹⁰ http://www.bipm.org/utls/common/documents/jcrb/working_groups_CMCs.pdf

GLOSSARY

BIPM	Bureau international des poids et mesures (International Bureau of Weights and Measures)
CC	Consultative Committee of the CIPM
CIPM	Comité international des poids et mesures (International Committee of Weights and Measures)
CMC	Calibration and Measurement Capability
JCRB	Joint Committee of the RMOs and the BIPM
KCDB	BIPM key comparison database
MRA	Mutual Recognition Arrangement
NMI	National Metrology Institute
RMO	Regional Metrology Organization
TC	Technical Committee
WG	Working Group