

CCPR ACTIVITIES AND THE CIPM MRA

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Abstract

Technical regulations and standards may vary from country to country, region to region, posing a challenge for producers and exporters. Within an environment of thriving international trade, an alignment with international standards is necessary for testing results that certify quality. In order to make the "One-stop Testing" specified by the WTO/TBT Agreement (World Trade Organization Agreement on Technical Barriers to Trade) a reality, the importance of "International Mutual Agreement Certification" based on international Mutual Recognition Agreement (MRA) has been increased. Measurement standard of variety quantities maintained by National Metrology Institute (NMI) is also one of such standards which should be aligned. The definition of each measurement unit of the Metric system is specified by SI Brochure [1] under the Metre Convention [2]. Practical realizations of the definitions are also described. They enable primary standard maintained by each NMI to be equal in principle.

However in reality, primary standard of each NMI may vary within its uncertainty level. In an alignment of WTO/TBT, our step beyond shall be to confirm the degree of equivalence of Calibration and Measurement Capabilities (CMCs) maintained by each NMI. To confirm the equivalency of CMCs, international comparisons of measurements (intercomparisons) is the most effective way. Actually, NMIs had paid much efforts on intercomparisons before the WTO/TBT came up. However, information of comparison in the past has not been always disclosed, or consolidated, or shown in a common format. In 1999, the Mutual Recognition Arrangement of the Metre Convention drawn up by the CIPM (International Committee of Weight and Measures) was engaged to establish the degree of equivalence of CMC of NMIs systematically. The fundamental elements of MRA (here after CIPM MRA) [3] are summarized as follows.

1. Participation by the institute in reviewed and approved scientific comparisons.

The range of measurement, traveling standard, measurement procedures and conditions of intercomparison should be specified scientifically. The categories, intervals, analysis of uncertainties should be also agreed.

2. Operation by the institute of an appropriate and approved quality management system.

Intercomparison is the most direct evidence of the equivalency of CMC. However, it is a kind of "snap shot" of the measurement capability of the participant. Appropriate quality management which guarantees consistent measurement of the institute.

3. International peer-review (regional and inter-regional) of claimed calibration and measurement capabilities.

The claimed CMCs are reviewed by international peers, normally from other NMIs, whether the CMCs are satisfied by relevant intercomparison results, maintained regularly by quality management system.

A number of Consultative Committees (CCs), composed from the world's experts in their specified fields, implement above essential issues. In the field of photometry and radiometry, CCPR (Consultative Committee for Photometry and Radiometry) initiated harmonization of the comparisons (scope, procedure, analysis of the results), operation of the comparisons, and harmonization of peer-review criteria. The results of the intercomparison as the degrees of equivalence of each participant relative to an agreed reference value (deviation + uncertainty)

are published in the data of graphs in an open access database (the BIPM key comparison database; given hereafter as the KCDB) [4] as part of the CIPM MRA. CMC declared by NMIs and validated by international experts on the bases of results obtained in international comparisons are also published in the KCDB.

The CIPM MRA has been signed by the representatives of 98 institutes – from 53 Member States, 41 Associates of the CGPM (General Conference on Weights and Measures), and 4 international organizations – and covers a further 152 institutes designated by the signatory bodies as of March 2015. The outcomes of the MRA are expected to be used by regulatory authorities (customs officials, accreditors, etc.) and end customers of metrological services or devices in the validity of calibration certificates and other metrological documents. Huge number of comparisons and CMCs have been taken and published. In the field of PR, there have been a total of 29 key comparisons that have been published and approved for equivalence. The results of these comparisons support a total of 1224 CMCs (up to 2012) in the fields of photometry, properties of sources and detectors, and properties of materials and fibre - optics.[5]

Reaching its 15th year of the CIPM MRA, it has been very beneficial to the metrology community. However, the success comes at a price. The maintenance of the various processes defined to support the CIPM MRA (comparisons, peer review) occupies substantial resources at the participating institutes, the consultative committees. Currently, how to define the needs and simplify the system is under discussion. The CIPM MRA is a response to a growing need for an open, transparent and comprehensive scheme to give users reliable quantitative information on the comparability of national metrology services and to provide the technical basis for wider agreements negotiated for international trade, commerce and regulatory affairs. Thus it should be seriously evaluated how the CMCs are well referred by other stakeholders, such as government authorities, standardization bodies, laboratory accreditors, legal metrology communities, and industries.

In this presentation, detailed CIPM MRA implementations mainly in the PR field to be reported. The CCPR guidelines which the comparisons and review works well for CMC publication are mentioned. Expected outcomes from the CMCs will be described and discussed. Current concerns and the future subjects of the CIPM MRA will be also discussed.

References

- [1] SI Brochure: The International System of Units (SI) [8th edition, 2006; updated in 2014], <http://www.bipm.org/en/publications/si-brochure/>
- [2] The Metre Convention, <http://www.bipm.org/en/worldwide-metrology/metre-convention/>
- [3] MUTUAL RECOGNITION OF NATIONAL MEASUREMENT STANDARDS AND OF CALIBRATION AND MEASUREMENT CERTIFICATES ISSUED BY NATIONAL METROLOGY INSTITUTES Arrangement drawn up by the International Committee of Weights and Measures, under the authority given to it in the Metre Convention., http://www.bipm.org/utis/en/pdf/mra_2003.pdf
- [4] The BIPM key comparison database, <http://kcdb.bipm.org/>
- [5] CCPR Strategy Document 1 March 2013, <http://www.bipm.org/en/committees/cc/ccpr/>