Policy on Metrological Traceability of Measurement results

1. Scope:

This document covers SLAB's policy on metrological traceability concerning testing and/or calibration, inspection and certification activities.

2. Reference:

ILAC P10 - ILAC Policy on Metrological Traceability of Measurement Results

JCGM 200 - International Vocabulary of Metrology (VIM)- Basic and general concepts and associated terms

3. Responsibility:

All applicant and accredited Conformity Assessment Bodies (CABs)
Authorized Officer
Technical Manager
Team Leaders/ Technical Assessors/ Assessors
Accreditation Committee members

4. Definitions:

4.1 Metrological traceability (VIM 3 clause 2.41):

Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.

Note 1: For this definition a 'reference' can be a "definition of a measurement unit through its practical realization, or a measurement procedure including the measurement unit for a nonordinal quantity, or a measurement standard".

4.2 Metrological traceability chain (VIM 3 clause 2.42):

Sequence of measurement standards and calibrations that is used to relate a measurement result to a reference

4.3 Metrological traceability to a measurement unit (VIM 3 clause 2.43):

Metrological traceability where the reference is the definition of a measurement unit through its practical realization.

Note: The expression "traceability to the SI" means 'metrological traceability to a measurement unit of the International System of Units'.

4.4 BIPM (International Bureau of Weights and Measures):

BIPM is the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards.

4.5 CIPM MRA (International Committee for Weights and Measures Mutual Recognition Arrangement):

The CIPM MRA – is an arrangement between National Metrology Institutes which provides the technical framework to assure the mutual recognition of national measurement standards and for recognition of the validity of calibration and measurement certificates issued by National Metrology Institutes.

4.6 JCTLM:

Joint Committee for Traceability in Laboratory Medicine JCTLM formed by the BIPM, the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) and ILAC, provides a worldwide platform to promote and give guidance on internationally recognized and accepted equivalence of measurements in Laboratory Medicine and traceability to appropriate measurement standards

4.7 KCDB (Key Comparison Database):

The KCDB is a publicly available, free web resource related to the CIPM MRA. It contains information on participants of the CIPM MRA, results of key and supplementary comparisons and peer reviewed Calibration and Measurement Capabilities (CMCs) (https://www.bipm.org/kcdb).

4.8 National Metrology Institute (NMI):

National Metrology Institute (NMI) and Designated Institutes (DI) maintain measurement standards in countries (or regions) all over the world. Throughout this document, the term "NMI" is used to cover both a National Metrology Institute as well as a Designated Institute.

4.9 Calibration (VIM3 clause 2.39):

Operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication.

VIM NOTE 1 A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

VIM NOTE 2 Calibration should not be confused with adjustment of a measuring system, often mistakenly called "self-calibration", nor with verification of calibration.

VIM NOTE 3: Often, the first step alone in the above definition is perceived as being calibration.

4.10 Calibration and Measurement Capability (CMC):

A CMC as per the CIPM MRA is a calibration and measurement capability available to customers under normal conditions:

a) as described in the laboratory's scope of accreditation granted by a signatory to the ILAC Arrangement; or
b) as published in the BIPM key comparison database (KCDB) of the CIPM MRA.

4.11 Mutually Recognized Accreditation Body:

An accreditation body that is a signatory to the ILAC MRA.

4.12 Reference Material (ISO 17034:2016):

Material, sufficiently homogeneous and stable with respect to one or more specified properties, which has been established to be fit for its intended use in a measurement process.

4.13 Reference Material Producer (ISO 17034:2016):

Body (organization or company, public or private) that is fully responsible for project planning and management; assignment of, and decision on property values and relevant uncertainties; authorization of property values; and issuance of a reference material certificate or other statements for the reference materials it produces.

5. Policy on metrological traceability of measurement results

1) A National Metrology Institute (NMI) whose service is suitable for the intended use and is covered by the International Committee for Weight and Measures Mutual Recognition Arrangement (CIPM MRA). Services covered by the CIPM MRA can be viewed in the Bureau International des Poids et Mesures Key Comparison Database (BIPM KCDB) which includes CMCs for each listed service.

Note 1: Some NMIs may also indicate that their service is covered by the CIPM MRA by including the CIPM MRA logo on their calibration certificates, however the fixing of the logo is not mandatory and the BIPM KCDB remains the authoritative source of verification.

Note 2: NMIs from Member States participating in the Metre Convention may take metrological traceability directly from measurements made at the BIPM. The KCDB provides an automatic link to the relevant BIPM calibration services (including the range and uncertainty). Individual calibration certificates issued by the BIPM are also listed.

or

2) An accredited calibration laboratory whose service is suitable for the intended use (i.e., the scope of accreditation specifically covers the appropriate calibration) and the Accreditation Body is covered by the ILAC Arrangement or by Regional Arrangements recognised by ILAC.

Note 3: Only certificates bearing the accreditation symbol or a text reference to the accreditation of the calibration laboratory can benefit fully from the recognition that the ILAC MRA and its regional counterparts bring. Calibration laboratories can indicate that their service is covered by ILAC Arrangement by including on the calibration certificate:

- The combined ILAC MRA mark, or
- The accreditation mark of the Accreditation Body (that is signatory to ILAC Arrangement) or the reference to its accreditation status. Both of these options can be taken as evidence of metrological traceability (ILAC P8).

or

The following two options shall only be applicable when options 1) and 2) above are not possible for a particular calibration.

3a) A NMI whose service is suitable for the intended use but not covered by the CIPM MRA.

or

3b) A non-accredited calibration laboratory whose service is suitable for the intended need but not covered by the ILAC Arrangement or by Regional Arrangements recognized by ILAC.

If CAB choose option 3a) and 3b), it shall not be purely on economic grounds and more likely to be a last resort. The CAB shall therefore ensure that appropriate evidence for claimed metrological traceability and measurement uncertainty is available and the evidence will be assessed by SLAB during assessments.

The metrological traceability provided by Reference Material Producers (RMPs) through Certified Reference Materials (CRMs) is that the certified values assigned to CRMs are considered to have established valid metrological traceability when:

4) CRMs are produced by NMIs using a service that is included in the BIPM KCDB.

or

5) CRMs are produced by an accredited RMP under its scope of accreditation and the Accreditation Body is covered by the ILAC Arrangement or by Regional Arrangements recognised by ILAC.

or

6) The certified values assigned to CRMs are covered by entries in the Joint Committee for Traceability in Laboratory Medicine (JCTLM) database.

Recognizing that the accreditation of RMPs is still developing and CRMs may not be available from accredited RMPs, where CRMs are produced by non-accredited RMPs, Accredited CAB shall demonstrate that CRMs have been provided by a competent or recognised RMP and that they are suitable for their intended use.

When metrological traceability to the SI is not technically possible, it is the responsibility of the Accredited CAB to:

7a) Choose a way to satisfy metrological traceability requirements by using certified values of certified reference materials provided by a competent producer.

or

7b) Document the results of a suitable comparison to reference measurement procedures, specified methods, or consensus standards that are clearly described and accepted as providing measurement results fit for their intended use. Evidence of this comparison will be assessed by SLAB during assessments.

Note 4: When metrological traceability to solely SI units is not appropriate or applicable to the application, a clearly defined measurand should be selected. Establishing metrological traceability therefore includes both the proof of identity of the property measured and the comparison of the results to an appropriate stated reference. The comparison is established by ensuring the measurement procedures are properly validated and/or verified, that measuring equipment is appropriately calibrated and that conditions of measurement (such as environmental conditions) are under sufficient control to provide a reliable result.

Note 5: Surplus test materials are often available from proficiency testing (PT) providers. It should be checked whether the PT provider can provide additional stability information to demonstrate the ongoing stability of the property value and matrix of the test material. If this cannot be provided, these test materials should not be considered as an alternative way to ensure the validity of results.