



## **Measurement Traceability Policy**

**2010**

The following pages describe the responsibilities of testing and calibration laboratories seeking accreditation to ISO/IEC 17025:2005 by PJLA in reference to measurement traceability.



For the purpose of this procedure, the term ‘traceability’ is defined as the process by which the result of a measurement is compared to an international or national standard. Traceability is characterized by a number of essential elements<sup>1</sup>:

- An unbroken chain of comparisons going back to a standard acceptable to the parties; usually a national or international standard;
- Measurement uncertainty; the measurement uncertainty for each step in the traceability chain must be calculated according to defined methods and must be stated so that overall uncertainty for the whole chain may be calculated or estimated;
- Documentation; each step in the chain must be performed according to documented and generally acknowledged procedures; the results must be equally documented;
- Competence; the laboratories or bodies performing one or more steps in the chain must supply evidence for their technical competence (e.g. by demonstrating that they are accredited);
- Reference to the SI units; the chain of comparisons must, where possible, end at primary standards for the realization of the SI units;
- Calibration Intervals; calibrations must be repeated at appropriate intervals; the length of these intervals depends on a number of variables, (e.g. uncertainty required, frequency of use, manner of use, stability of equipment).

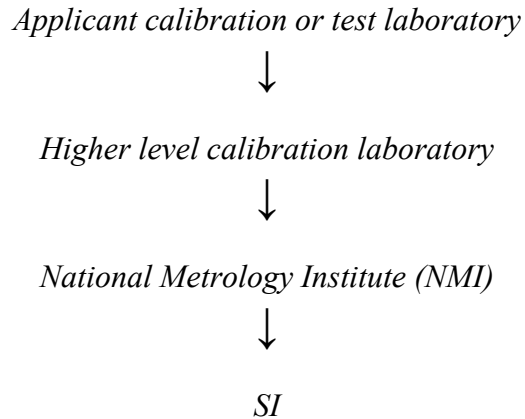
### **Traceability Requirements: Calibration Laboratories and Testing Laboratories performing calibrations for their organization**

In order to achieve accreditation, the applicant laboratory must have documented policies and procedures for the calibration of all equipment having a significant effect on the accuracy or validity of results. *ISO/IEC 17025:2005 Section 5.6.1.*

This significance shall be determined using the method specified in the Estimation of Measurement Uncertainty procedure of the applicant laboratory.

The process defined in the aforementioned procedure shall ensure that the results of calibrations and measurements made by the laboratory are traceable to the International System of Units (SI) through an unbroken chain of comparisons. *ISO/IEC 17025:2005 Section 5.6.2.1.1*

A simple example for an unbroken chain of comparisons is as follows:



**NOTE:** Estimations of measurement uncertainty must be calculated (or provided) for each part of the chain so that the overall uncertainty of measurement can be calculated.

The relationship between the measurement result and the SI can also be demonstrated by reference to:

- **Primary standards<sup>2</sup>**-measurement standard established using a primary reference measurement procedure, or created as an artifact, chosen by convention.
- **Secondary standards<sup>2</sup>**- measurement standard established through calibration with respect to a primary measurement standard for a quantity of the same kind
- **Intrinsic measurement standard<sup>2</sup>** – measurement standard based on an inherent and reproducible property of a phenomenon or substance

There are some calibrations and tests for which a direct link to the SI is impracticable. If traceability to the SI cannot be realized, the applicant laboratory shall establish traceability to appropriate measurement standards such as:

- The use of certified reference materials provided by a competent supplier to give a reliable physical or chemical characterization of a material or condition;
- The use of specified methods and/or consensus standards that are clearly described and agreed upon by all parties concerned. *ISO/IEC 17025: 2005 Section 5.6.2.1.2*

Reference materials or consensus standards maintained by the laboratory must be used for no purpose other than calibration, unless it can be shown that their performance as reference standards would not be invalidated. The laboratory shall have and shall employ a documented



procedure for the calibration of these reference standards. This procedure must contain the interval at which calibration of the reference standards must be repeated.

In addition, the applicant laboratory shall have documented procedures detailing the verification, transport and storage of reference materials and reference standards.

In the event that the applicant laboratory employs the services of an external calibration provider, PJLA requires that said external laboratory be accredited to ISO/IEC 17025: 2005 for the calibration performed or deemed competent by a National Metrology Institute (NMI) recognized by the CIPM Mutual Recognition Arrangement (MRA). Evidence of competency might take the form of the Certificate of Measurement Traceability issued to State Laboratories by NIST in the US economy. As an APLAC/ILAC MRA signatory, PJLA recognizes and accepts the accreditations of laboratories issued by other MRA signatories. The applicant laboratory shall have on file and make available to PJLA assessors the current certificate and scope of accreditation of the calibration laboratory used. PJLA recognizes that there may be cases where utilizing an ISO/IEC 17025:2005 accredited calibration laboratory may not be possible. In this case, the laboratory must be able to demonstrate and substantiate (typically with documentary evidence) traceability for the measurement service that was provided by the non-accredited laboratory.

#### **Traceability Requirements: Non-accredited external calibration providers**

Use of non-accredited external calibration providers will be approved on a case-by-case basis. PJLA HQ and Assessor approval will be required. When an approval is issued, the laboratory receiving the deviation will be solely responsible for verifying traceability of the calibration or calibrations performed by the non-accredited external calibration provider. Such verification shall be maintained on file by the laboratory and shall consist of any documentation provided by the external calibration provider and the basis for the laboratories acceptance of the claim of traceability. All documents and records associated with the laboratories verification shall be made available for review by PJLA staff or assessors upon request. PJLA reserves the right to reject a claim of traceability if in the opinion of PJLA all necessary requirements for establishing traceability have not been satisfied. Should it be determined that a claim of traceability is not adequately established and therefore rejected, PJLA will initiate its policy for removal of the affected calibration or test activity from the scope of accreditation of the laboratory involved. Laboratories should consult the NIST or other appropriate NMI websites for information required to demonstrate and substantiate traceability.

#### **Traceability Requirements: Testing Laboratories**

For testing laboratories, PJLA's policies for calibration laboratories regarding measurement traceability must be maintained (see above). Where practicable, an unbroken link to the SI must be demonstrated through objective, verifiable evidence. In the event that traceability to the SI is not possible, the testing laboratory shall demonstrate traceability to applicable and accepted reference standards, methods or consensus standards as described above. *ISO/IEC 17025:2005 Section 5.6.2.2.2*



The applicant testing laboratory shall have documented policies and procedures regarding measurement traceability and reference this traceability on test reports/certificates. In addition, the applicant laboratory shall have documented procedures detailing the verification, transport and storage of reference standards.

**Traceability Requirements:** Accredited Calibration and Testing Laboratories

Upon attainment of accreditation, Calibration and Testing Laboratories are required to maintain the traceability of calibration and test results in the same manner as detailed previously for applicant laboratories.

**References**

<sup>1</sup> ILAC-P10: 2002 *Policy on Traceability of Measurement Results*

<sup>2</sup> International Vocabulary of Basic and General Terms in Metrology (VIM), IASO/IEC/OIML/BIPM. JCGM 2008