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## Traceability of Measurement policy



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Document No.

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## 1. Scope:

This policy outlines AAA policy on traceability of measurement for laboratories accredited to ISO/IEC 17025, ISO 15189 and inspection bodies accredited to ISO/IEC 17020.

## 2. Introduction on traceability of measurement

- 2.1 Because measurement results form the basis for many critical decisions in testing and inspection, it is crucial that all measurements are made with the appropriate assurance of accuracy and traceability.
- 2.2 Proper calibration of instrumentation traceable to international measurement standards is an essential first step to ensuring the required accuracy.
- 2.3 Accuracy is defined as the closeness of the agreement between the result of a measurement and the (conventional) true value of the measured quantity. The quantitative expression of this concept should be in terms of uncertainty. The accuracy of measurement achieved is influenced by a number of factors, including:
- The nature of the measuring instrument used;
  - The calibration status of the measuring instrument;
  - The environment in which the measurement is carried out;
  - The procedure followed in performing the measurement.
- 2.4 The responsibility for specifying the level of uncertainty to be achieved in tests lies with the laboratories/inspection bodies themselves. Therefore the organization's testing / inspection arrangements (including supporting calibration) have to be sufficient (and have to be shown to be sufficient) to achieve the level of uncertainty claimed. The verification that these arrangements are indeed adequate to ensure the level of uncertainty claimed

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will form a central part of the AAA assessment procedure. AAA will also wish to establish that the claimed uncertainty is compatible with limits stated or implied in technical specifications for the tests / inspections for which the laboratory holds or seeks accreditation, and that it is consistent with generally accepted technical considerations in the area of testing / inspection concerned.

- 2.5 Traceability of measurement is essential if the results of various measurements are to be mutually comparable, and if uncertainty of measurement is to be meaningfully assigned. AAA requires that all measurements necessary for the proper performance of a test/inspection are traceable to international units of measurement, where the concept is applicable. This applies not only to the principal measurements involved in the test / inspection, but also to any subsidiary measurements that may significantly affect the results of the test / inspection or its validity.
- 2.6 If traceability is to achieve its purpose, not only must an unbroken chain of calibrations exist, but every calibration in the traceability chain must be carried out in a technically sound manner: the staff, equipment, environment and procedures involved in the calibration must be adequate for the task involved. The precise technical requirements that are appropriate, for any given calibration, depend on a number of features, including the accuracy sought in the calibration, the nature of the equipment involved, and the use to which the calibrated equipment is to be put.
- 2.7 For most types of test / inspection, it is necessary for the calibrations to be carried out in accordance with quite stringent technical requirements, at all stages of the calibration chain.
- 2.8 For more straightforward types of test measurement on the other hand (or for subsidiary measurements whose accuracy does not significantly affect the test result or its validity), the technical requirements at the lower end of the

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traceability chain may be less stringent.

- 2.9 Such determinations will consider the impact of the overall uncertainty of the measurement on the final result.
- 2.10 Intervals between calibrations of measuring standards and measuring equipment shall be established by the laboratory or inspection body on the basis of stability, purpose and usage. Intervals shall be established so that recalibration occurs prior to any probable change in accuracy that is of significance to the use of the equipment. Depending on the results of preceding calibrations, intervals of calibration shall be shortened, if necessary, to ensure continued accuracy.
- 2.11 The selection of a conservatively short initial calibration interval and documented reviews of these intervals in the light of calibration results are features of a good calibration system which will be sought by the AAA assessors.

### **3. AAA general policy for traceability of measurement**

- 3.1 Organizations accredited by AAA shall be able to demonstrate that calibration of critical equipment, and hence the calibration, inspection or test result generated by that equipment, relevant to their scopes of accreditation, is traceable to the International System of Units (SI units).
- 3.2 “Critical” equipment used by testing and calibration laboratories and inspection bodies is considered by AAA to be those items of equipment necessary to perform a test, calibration or inspection from the scope of accreditation and which have a significant effect on the uncertainty of measurement of test, calibration or inspection result. ‘Significant’ is defined as changing the value of the expanded uncertainty by 5% or more.
- 3.3 AAA recognizes that, due to the nature of some tests, it is not possible, realistic

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or relevant to expect traceability of measurement results.

3.4 For equipment, reference standards where calibration is required the following are acceptable sources of traceability:

- I. Directly from an appropriate national metrology institute whose service is suitable for the intended need and is covered by the CIPM MRA. or
- II. From a calibration laboratory that can demonstrate competence, measurement capability and traceability with appropriate measurement uncertainty, e.g. an accredited calibration laboratory whose service is suitable for the intended need (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 recognized by ILAC. or
- III. An NMI whose service is suitable for the intended need but not covered by the CIPM MRA.
- IV. A calibration laboratory whose service is suitable for the intended need but not covered by the ILAC Arrangement or by Regional Arrangements recognized by ILAC.

3.5 Laboratories that have demonstrated traceability of their measurements through the use of calibration services offered according to i) or ii) above have made use of services that have been subject to relevant peer review or accreditation. In the situation where iii) or iv) applies, this is not the case, so these routes should only be applicable when i) or ii) are not possible for a particular calibration. The laboratory must therefore ensure that appropriate evidence for claimed traceability and measurement uncertainty is available. AAA will undertake an assessment of this evidence.

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- 3.6 It is emphasized that calibration certificates issued by equipment manufacturers or agents are not acceptable evidence of external traceability, unless these are clearly identified as having been issued by an accredited calibration laboratory.
- 3.7 Accredited testing laboratories and inspection bodies shall be required by AAA to ensure the traceability of their in-house calibrations and/or accredited test and inspection results to an external calibration provider that is accredited for suitably small uncertainties or that can otherwise demonstrate its competence, or to a national metrology institute or national reference laboratory or to a certified reference material or mutual consent standard or agreed method.
- 3.8 If the calibration of instruments used in testing contributes significantly to the overall uncertainty, the same policy for traceability applies as for calibration laboratories applies, 4.2 i) to iv) above.
- 3.9 Accredited testing laboratories and inspection bodies: If the calibration is not a dominant factor in the overall testing result, the laboratory shall have documented

#### **4. AAA Policy on Internal Calibrations for Testing Laboratories**

- 4.1 Testing laboratories may choose to carry out some calibration activities in house to support their measurement activities, rather than seeking the services of an external accredited laboratory.
- 4.2 Where a test laboratory chooses this option, it is essential that these calibration activities provide appropriate traceability of results.
- 4.3 It is reasonable to expect that in-house calibrations are subject to the same technical level that would be obtained if an external accredited laboratory or recognized NMI were used.
- 4.4 The following shall be in place:

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- 4.4.1 A suitable environment in which to conduct the calibration;
- 4.4.2 Trained and authorized personnel to both conduct the calibrations and to carry out any necessary checks;
- 4.4.3 Reference standards, certified reference materials or reference measuring instruments that provide traceable results with suitable measurement uncertainties;
- 4.4.4 A controlled and documented procedure for each type of calibration;
- 4.4.5 A means of recording and reporting the data and results of any calculations;
- 4.4.6 A suitable level of quality control activities;
- 4.4.7 A process for calculating the measurement uncertainty for each calibration;
- 4.4.8 Trained and authorized staff to perform the calibrations;

## 5. References:

- ISO/IEC 17025:2005/2017 General requirements for the competence of testing and calibration laboratories
- ISO 15189:2012 Medical laboratories - Particular requirements for quality and competence
- ISO/IEC 17020:2012 Conformity assessment - Requirement's for the operation of various types of bodies performing inspection
- ISO/IEC 17011:2017 Requirements for bodies providing assessment and accreditation of conformity assessment bodies
- Guidelines for the determination of calibration intervals of measuring instruments, ILAC G24
- ILAC policy on traceability, ILAC P10

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