

## **IAS CALIBRATION LABORATORY ACCREDITATION PROGRAM: DEFINITIONS**

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### **REFERENCES**

NIST Handbook 330.

VIM (International Vocabulary of Basic and General Terms in Metrology).

### **DEFINITIONS**

**ACCREDITATION:** Formal recognition that a laboratory is competent to carry out specific tests or calibrations or types of tests or calibrations.

**ACCREDITATION CRITERIA:** Set of requirements used by an accrediting body which a laboratory must meet in order to be accredited.

**APLAC:** Asia Pacific Laboratory Accreditation Cooperation.

**ASSESSMENT:** Examination typically performed on-site of a testing or calibration laboratory to evaluate its compliance with conditions and criteria for accreditation.

**AUTHORIZED REPRESENTATIVE:** Individual who is authorized by the laboratory or parent organization to sign the accreditation application and commit the laboratory to fulfill the accreditation criteria.

**BEST MEASUREMENT CAPABILITY:** Smallest uncertainty of measurement a laboratory can achieve within its scope of accreditation when performing more-or-less routine calibrations of nearly ideal measurement standards intended to define, realize, conserve, or reproduce a unit of that quantity or one or more of its values; or when performing more-or-less routine calibrations of nearly ideal measuring instruments designed for the measurement of that quantity or one or more of its values

**CALIBRATION:** Set of operations that establish under specified conditions the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding value realized by standards.

## *IAS Calibration Laboratory Accreditation Program - Definitions*

**CALIBRATION PROCEDURE:** A documented, verified, and validated procedure that specifically describes a set of operations used in the performance of particular measurements according to a given method.

**CALIBRATION PROGRAM:** Calibration programs include external calibration providers and internal calibration providers, the calibrations performed, and the management and control systems and procedures to oversee the calibration actions and providers.

**CALIBRATION PROVIDER:** Laboratory or facility including personnel that perform calibrations in an established location or at customer location(s). May be external or internal, including subsidiary operations of a larger entity.

**CERTIFICATE OF ACCREDITATION:** Document issued by IAS to a laboratory that has met the conditions and criteria for accreditation. A current Certificate of Accreditation, accompanied by a Scope of Accreditation, may be used as proof of accredited status.

**CUSTOMERS:** Any person or organization that engages the services of a testing or calibration laboratory.

**COMBINED STANDARD UNCERTAINTY:** Standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or covariances of these other quantities weighed according to how the measurement result varies with changes in these quantities

**COMPETENCE:** Ability of a laboratory to meet the conditions and conform to the criteria established for specific test and calibration methods.

**CONTRACT STAFFING:** Calibration laboratory employees assigned to a customer location and/or customer calibration facilities under a contract arrangement.

**COVERAGE FACTOR:** numerical factor used as a multiplier of the combined standard uncertainty in order to obtain an expanded uncertainty

**DEFICIENCY:** Non-fulfillment of conditions and/or criteria for accreditation, sometimes referred to as a non-conformance.

**DESK REVIEW:** Examination typically performed prior to an on-site assessment, of the Quality Manual, application package, and other materials and documentation as necessary and appropriate to determine to the extent possible the laboratory's conformance to the conditions and criteria for accreditation.

**ERROR OF MEASUREMENT:** Result of a measurement minus the accepted true value of the measurand.

## *IAS Calibration Laboratory Accreditation Program - Definitions*

**EQUIVALENCE:** An acceptance of the competence of other NMI's, accreditation bodies, and/or accredited organizations in other countries as being essentially equal to the NMI, accreditation body, and/or accredited organizations within the host country.

**EXPANDED UNCERTAINTY:** quantity defining an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand.

- The fraction may be viewed as the coverage probability or level of confidence of the interval.
- To associate a specific level of confidence with the interval defined by the expanded uncertainty requires explicit or implicit assumptions regarding the probability distribution characterized by the measurement result and its combined standard uncertainty. The level of confidence that may be attributed to this interval can be known only to the extent to which such assumptions may be justified.

**GAGE R&R:** Gage Repeatability and Reproduceability study, which (typically) employs numerous instruments, personnel, calibration actions over a period of time to capture quantitative observations. The data captured is analyzed statistically to obtain Type A uncertainty as a component of Best Measurement Capability (BMC), which is expressed as an uncertainty with a coverage factor of  $k=2$  to approximate 95%. The number of instruments, personnel, calibration actions, and length of time are established to be statistically valid consistent with the size and level of activity of the organization. Type B uncertainty components are included using a root-sum-square approach to develop the expanded uncertainty and BMC

**ILAC:** International Laboratory Accreditation Cooperation.

**ILC/PT:** Interlaboratory comparison/proficiency test.

**INTERLABORATORY COMPARISONS:** Organization, performance, and evaluation of tests or calibrations on the same or similar items or materials by two or more laboratories in accordance with predetermined conditions.

**INTERNAL AUDIT:** Systematic and documented process for obtaining evidence and evaluating it objectively to verify that a laboratory's operations comply with the requirements of its quality system.

**INTERNATIONAL STANDARD:** (documentation) A document outlining and/or defining requirements and/or conditions, recognized by international agreement to serve as a common basis for evaluation of affected systems, protocols, and/or methods (e.g. ANS/ISO/IEC Standard 17025:2005). (Measurement) Standard recognized by international agreement to serve internationally as the basis for assigning values to other standards of the quantity concerned (e.g. Meter).

## *IAS Calibration Laboratory Accreditation Program - Definitions*

**LABORATORY:** Organization that performs tests and/or calibrations in a permanent, temporary, or remote location. When a laboratory is part of an organization that carries out activities additional to testing/calibration, the term laboratory then refers to only the part(s) of the organization involved in testing and/or calibration process.

**LABORATORY ACCREDITATION BODY:** Body that conducts and administers a laboratory accreditation system in accordance with ISO/IEC 17011:2004 and grants accreditation.

**LABORATORY ACCREDITATION SYSTEM:** System with its own defined rules of procedure and management, consistent with ISO/IEC 17011:2004, for carrying out laboratory accreditation.

**LEVEL OF CONFIDENCE:** Defines an interval about the measurement result that encompasses a large fraction  $p$  of the probability distribution characterized by that result and its combined standard uncertainty, and  $p$  is the *coverage probability or level of confidence* of the interval. Effectively, the coverage level expressed as a percent.

**MANAGEMENT REVIEW:** Formal, periodic, and scheduled examination by top management of the status and adequacy of the quality system in relation to quality policy and objectives.

**MEASURAND:** Particular quantity subject to measurement.

**MEASUREMENT:** Set of operations having the object of determining a value of a quantity.

**MEASURING INSTRUMENT:** Device intended to make measurements, alone or in conjunction with supplementary device(s).

**MOBILE OPERATIONS:** Operations that are independent of an established calibration laboratory facility. Mobile operations may work from an office space, home, vehicle, or use a virtual office.

**MRA:** Mutual Recognition Arrangement.

**NACLA:** National Cooperation for Laboratory Accreditation.

**NATIONAL METROLOGY INSTITUTE (NMI):** A lab considered to be the primary source of standards in a given country.

**NATURAL CONSTANT:** Fundamentals values upon which scientists base descriptions of our universe and theories that describe our natural world. Examples include the speed of light, the gravitational constant and the charge of an electron.

**ON-SITE OPERATIONS:** Operations that are based in and/or directly supported by an established calibration laboratory facility, but actually perform the calibration actions at customer locations. This includes climate-controlled mobile laboratories such as converted motor homes.

## *IAS Calibration Laboratory Accreditation Program - Definitions*

**ORGANIZING BODY:** An independent organization that coordinates ILC/PT on behalf of one or more accrediting bodies, and/or one or more laboratories. The organizing body oversees the ILC/PT process, and develops and publishes appropriate reports, in accordance with the standards defined in this policy.

**PRECISION:** Repeatability of measurement data; the similarity of successive independent measurements of a single magnitude generated by repeated applications of a process under specified conditions.

**PROFICIENCY TESTING:** Determination of laboratory testing performance by means of interlaboratory comparisons conducted by an authorized third party.

**QUALITY MANUAL:** Document stating the quality policy and describing the quality management system of an organization.

**QUALITY SYSTEM:** Organizational structure, procedures, processes, and resources needed to implement quality management.

**REFERENCE MATERIAL:** Material or substance one or more of whose property values are sufficiently homogeneous and well-established to be used for the calibration of an apparatus, for the assessment of a measurement method, or for assigning values to materials.

**REFERENCE STANDARD:** Measurement standard generally having the highest metrological quality available at a given location or in a given organization, from which measurements made there are derived.

**REQUIREMENT:** Provision that conveys criteria to be fulfilled.

**SCOPE OF ACCREDITATION:** Document issued by IAS, to a laboratory that lists the calibration methods or services for which the laboratory is accredited. The scope of accreditation is always accompanied by a Certificate of Accreditation.

**SI UNITS:** SI Units is the International System of Units, a series of quantities in two classes.

- Base Units, regarded as dimensionally independent. They are: meter, kilogram, second, ampere, kelvin, mole, and candela.
- Derived Units, formed as products of the powers of the base units according to the algebraic relations linking the quantities concerned.

**STANDARD, PRIMARY:** Standard that is designated or widely acknowledged as having the highest metrological qualities and whose value is accepted without reference to other standards of the same quantity.

**STANDARD, SECONDARY:** Standard whose value is assigned by comparison with a primary standard of the same quantity.

## *IAS Calibration Laboratory Accreditation Program - Definitions*

**STANDARD, WORKING:** Standard that is used routinely to calibrate or check material measures, measuring instruments, or reference materials.

**STANDARD UNCERTAINTY:** Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty with suggested symbol  $u_j$ , and equal to the positive square root of the estimated variance  $u_j^2$ .

**STATEMENT OF UNCERTAINTY:** Statement on the calibration certificate or test report of the value of measurement uncertainty for any specific test or calibration.

**TRACEABILITY:** Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.

**UNCERTAINTY BUDGET:** The systematic description of uncertainties relevant to specific measurements or types of measurements, categorized by type of measurement, range of measurement, and/or other applicable measurement criteria.

**UNCERTAINTY OF MEASUREMENT:** Parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand.

**UNCERTAINTY, Type A (evaluation of):** Method of evaluation of uncertainty by the statistical analysis of series of observations.

**UNCERTAINTY, Type B (evaluation of):** Method of evaluation of uncertainty by means other than the statistical analysis of series of observations.

**UNCERTAINTY, Type A:** An uncertainty component obtained by a Type A evaluation is represented by a statistically estimated standard deviation  $s_i$ , equal to the positive square root of the statistically estimated variance  $s_i^2$ , and the associated number of degrees of freedom. For such a component the standard uncertainty is  $u_i = s_i$ .

**UNCERTAINTY, Type B:** In a similar manner, an uncertainty component obtained by a Type B evaluation is represented by a quantity  $u_j$ , which may be considered an approximation to the corresponding standard deviation; it is equal to the positive square root of  $u_j^2$ , which may be considered an approximation to the corresponding variance and which is obtained from an assumed probability distribution based on all the available information. Since the quantity  $u_j^2$  is treated like a variance and  $u_j$  like a standard deviation, for such a component the standard uncertainty is simply  $u_j$ .

**VALIDATION:** Substantiation by examination and provision of objective evidence that verified processes, methods, and/or procedures are fit for intended use.

**VERIFICATION:** Confirmation by examination and provision of objective evidence that specified requirements have been fulfilled.