Purpose

ALGERAC as member ILAC and EA has to harmonise its policies and procedures to mantain the EA/ILAC mutual recognition agreement.
This policy has been established to ensure a harmonised interpretation of the GUM and the consistent use of CMC by the applicant and accredited laboratories performing calibration and measurement.

Scope

This document sets forth the ALGERAC policy regarding the requirements for the evaluation of the Uncertainty of measurement in calibration and measurement, evaluation of the calibration and measurement capability (CMC),and the reporting of uncertainty on the certificates of calibration and measurement.

This document is applicable to calibration laboratories and testing laboratories that perform their own calibrations.

References

- ISO/IEC 17025:2017 Conformity assessment- General requirements for the competence of testing and calibration laboratories
- ILAC P14:01/2013 ILAC Policy for uncertainty in calibration
- EA-4/02:2013, Expressions of the Uncertainty of Measurements in Calibration
- JCGM 100:2008 GUM 1995 with minor corrections, Evaluation of measurement data – Guide to the expression of uncertainty in measurement.
- JCGM 200:2012 International vocabulary of metrology – Basic and general concepts and associated terms
- ISO/IEC Guide 99:2007, International vocabulary of metrology - Basic and general concepts and associated terms (VIM)
- ILAC P10:01/2013 ILAC Policy on the traceability of measurement result

Terms and Definitions

For the purpose of this document, the relevant terms and definitions given in the “International Vocabulary of Metrology – Basic and General Concepts and Associated Terms”,VIM, (ISO/IEC Guide 99/2007) and the following apply:

Calibration Laboratory

Laboratory that provides calibration and measurement services.

Calibration (VIM 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

Calibration and Measurement Capability

A CMC 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.

Abbreviations

BIPM: International Bureau of Weights and Measures
CIPM: International Convention of Weights and Measures
CMC: Calibration and Measurement Capability
EA : European Cooperation for Accreditation
GUM: Guide to the expression of Uncertainty in Measurement
ILAC: International Cooperation for Laboratories Accreditation
MRA: Multilateral Arrangement
KCDB: Key Comparisons Data Base

Policy

1) Expression of uncertainty in measurement

1.1) ALGERAC requires applicant and accredited calibration laboratories to estimate uncertainties of measurement for all calibrations and measurements covered by the scope of accreditation.

1.2) Calibration laboratories accredited by ALGERAC shall estimate uncertainties of measurement in compliance with the "Guide to the Expression of Uncertainty in Measurement" (GUM), and other documents published by other organisation (for example EA)

2) Scopes of Accreditation of Calibration Laboratories

2.1) The scope of accreditation of an accredited calibration laboratory shall include the calibration and measurement capability (CMC) expressed in terms of:

a) Measured or reference material;
b) Calibration/measurement method/procedure and/or type of instrument/material to be calibrated/measured;
c) Measurement range and additional parameters where applicable;
d) Uncertainty of measurement.

2.2) There shall be no ambiguity on the expression of the CMC on the scopes of accreditation and, consequently, on the smallest uncertainty of measurement that can be expected to be achieved by a laboratory during a calibration or a measurement. Particular care should be taken when the measurand covers a range of values. This is generally achieved through employing one or more of the following methods for expression of the uncertainty:

a) A single value, which is valid throughout the measurement range.
b) A range. In this case a calibration laboratory should have proper assumption for the interpolation to find the uncertainty at intermediate values.
c) An explicit function of the measurand or a parameter.
d) A matrix where the values of the uncertainty depend on the values of the measurand and additional parameters.
e) A graphical form, providing there is sufficient resolution on each axis to obtain at least two significant figures for the uncertainty.

Open intervals (e.g., "$U < x$") are not allowed in the specification of uncertainties.

2.3) The uncertainty covered by the CMC shall be expressed as the expanded uncertainty having a specific coverage probability of approximately 95 %. The unit of the uncertainty shall always be the same as that of the measurand or in a term relative to the measurand, e.g., percent.

2.4) Calibration laboratories shall provide evidence that they can provide calibrations to customers in compliance with 2.1 b) so that measurement uncertainties equal those covered by the CMC.

3) Statement of Uncertainty of Measurement on Calibration Certificates

Accredited calibration laboratories shall report the measured quantity value and the uncertainty of measurement, in compliance with the following requirements:

3.1) The measurement result shall normally include the measured quantity value y and the associated expanded uncertainty U. In calibration certificates the measurement result should be reported as $y \pm U$ associated with the units of y and U. Tabular presentation of the measurement result may be used and

the relative expanded uncertainty $U / |y|$ may also be provided if appropriate. The coverage factor and the coverage probability shall be stated on the calibration certificate. To this an explanatory note shall be added, which may have the following content:

> *"The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %. The standard uncertainty has been estimated according to EA 4/02."*

3.2) the numerical value of the expanded uncertainty shall be given to, at most, two significant figures. Further the following applies:

a) The numerical value of the measurement result shall in the final statement be rounded to the least significant figure in the value of the expanded uncertainty assigned to the measurement result.
b) For the process of rounding, the usual rules for rounding of numbers shall be used, subject to the guidance on rounding provided in Section 7 of the GUM.

3.3) Contributions to the uncertainty stated on the calibration certificate shall include relevant short-term contributions during calibration and contributions that can reasonably be attributed to the customer's device.

3.4) Accredited calibration laboratories shall not report a smaller uncertainty of measurement than the uncertainty of the CMC for which the laboratory is accredited.

GENERAL DIRECTOR

N.BOUDISSA