



KENYA ACCREDITATION SERVICE

Document Title: **POLICY ON MEASUREMENT UNCERTAINTY IN CALIBRATION LABORATORIES**

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Approval and Authorization

Completion of the following signature blocks signifies the review and approval of this Document.

Name	Job Title / Role	Signature	Date
Authored by	Assistant Director Testing and Calibration	<i>Approved</i>	16/03/2016
Checked by	Deputy Director Technical Services	<i>Approved</i>	16/03/2016
Approved by	Chief Executive Officer	<i>Approved</i>	16/03/2016

Periodic Review Approval and Authorization

Completion of the following signature blocks signifies the review and approval of this Document.

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1.1 Overview

KENAS Calibration Laboratory Accreditation Program states that for each measurement parameter and associated range(s), the laboratory shall provide with the application an uncertainty budget showing how the claimed Calibration and Measurement Capability (CMC) was derived. The assumptions made for the determination of the uncertainty budgets, if any, must be specified and documented. KENAS accredited and enrolled calibration laboratories shall calculate measurement uncertainties using the method detailed in the "Guide to the Expression of Uncertainty in Measurement" (GUM)

1.2 Purpose:

As a requirement of ISO/IEC 17025:2005 and for measurement traceability purposes, estimation of measurement uncertainty is key to the implementation of a robust laboratory management system. The purpose of this document is to describe how KENAS will interpret, apply and assess the application of measurement uncertainty within the requirements of ISO/IEC 17025:2005.

1.3 Scope:

Applies to laboratories providing quantitative measurement results to customers and are accredited or seeking accreditation under KENAS.

2.0 Terms and Definitions:

The table below defines the relevant definitions used in this document.

Term	Definition
Measurement Uncertainty	Refers to the measurement uncertainty calculation developed to demonstrate how the claimed Calibration and Measurement Capability (CMC) was derived for the scope of accreditation. It does not refer to the measurement uncertainty calculated as part of the measurement as reported on a calibration certificate.



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Significant	Means a contributor whose contribution increases the CMC by five percent (5%) or greater.
Standard Contributor	Refers to those items outlined in section 5.1.

3.0 Role(s) and Responsibility:

Role	Responsibility
ADTC	Implementation
Calibration Laboratories	Compliance

4.0 Policy:

4.1 Measurement Uncertainty Contributors

4.1.1 Every measurement uncertainty may take into consideration the following standard contributors, even in cases where they are determined to be insignificant, and documentation of the consideration shall be made:

- a) Repeatability (Type A)
- b) Resolution
- c) Reproducibility
- d) Reference Standard Uncertainty
- e) Reference Standard Stability
- f) Environmental Factors



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Note:

It should be noted that scope components such as resolution, may also contribute to other components such as repeatability. Therefore simply combining all components on an equal basis could result in an overstatement of the measurement uncertainty.

4.1.2 The measurement uncertainty shall also:

- a) Include those significant contributors that apply to the measurement.
- b) Include those significant contributors required by a method/procedure associated with the measurement.

4.2 General Considerations

4.2.1 The measurement uncertainty shall represent expanded uncertainties expressed at approximately the 95% level of confidence using a coverage factor of $k = 2$. The CAB shall provide records with the following elements for each estimation of measurement uncertainty.

- a) Statement defining the Measurand
- b) Statement of how traceability is established for the measurement,
- c) The equipment (e.g. measuring device[s] or instrument[s]) used,
- d) All uncertainty components considered,
- e) All uncertainty components of significance and how they were evaluated,
- f) Data used to estimate repeatability and/or reproducibility,
- g) All calculations performed,
- h) The combined standard uncertainty, the coverage factor, probability and the resulting expanded uncertainty.
- i) The schedule to review and/or recalculate the measurement uncertainty.

4.2.2 Calibration laboratories shall provide evidence that they can provide calibrations to customers in compliance with 4.2.1 so that measurement uncertainties equal those covered by the CMC. In the formulation of CMC, laboratories shall take notice of the



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performance of the “best existing device” which is available for a specific category of calibrations.

- 4.2.3 Where laboratories provide services such as reference value provision, the uncertainty covered by the CMC should generally include factors related to the measurement procedure as it will be carried out on a sample, i.e., typical matrix effects, interferences, etc. shall be considered. The uncertainty covered by the CMC will not generally include contributions arising from the instability or inhomogeneity of the material. The CMC should be based on an analysis of the inherent performance of the method for typical stable and homogeneous samples.
- 4.2.4 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.
- 4.2.5 As the definition of CMC implies, accredited calibration laboratories shall not report a smaller uncertainty of measurement than the uncertainty of the CMC for which the laboratory is accredited.

5.0 REFERENCE AND RELATED DOCUMENTS

Ref	Document Identifier	Document Title
1.	GUM	Guide to the expression of uncertainty in measurements
2.	ISO/IEC 17000	Conformity assessments – vocabulary and general principles
3.	ILAC P14	ILAC Policy for uncertainty in Calibration
4.	VIM	International Vocabulary for Metrology

6.0 TRAINING

Staff performing one or more of the roles specified in this policy and other new or revised policy shall be made aware of the existence of this policy. A period not more than one



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month shall be allocated between the issue date and effective date to facilitate such awareness.

7.0 REVISION HISTORY

Date	Ver	Revised By	Reason For Revision
16/03/2013	01	ADTC	<ul style="list-style-type: none">• Initial
16/03/2016	02	ADTC	<ul style="list-style-type: none">• Cast in the right template• Aligned to ILAC P14 requirements