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ATC

**EUROLAB Cook Book
and Guidance documents**

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Introduction

Quite frequently declaration of conformity of products implies a measurement process ...

*Mechanical metrology :
5 kN standard (LNE Paris)*

*Mechanical testing on a
bicycle carriage
(LNE Trappes)*

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Introduction

*Chemical metrology –
development of primary
analysis methods*

*Packaging – conformity
assessment to Food Contact
regulation*

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Introduction

... Sometimes written standards basically concerns the metrological performances of a device ...

NF 15140 – Thermal uniformity of a climatic chamber

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Introduction

... sometimes metrological conformity of devices is fixed by National Authorities (regulatory field).

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About accreditation

- ISO/IEC 17025
- Assess competence
 - Organization
 - Staff
 - Equipment
 - Traceability to the SI
 - QS
- Requires an internal audit using external assessors

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Outline

- Technical concepts and definitions :
 - Calibration and uncertainty
 - Traceability
 - Measurement process
 - Conformity assessment

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VIM definition

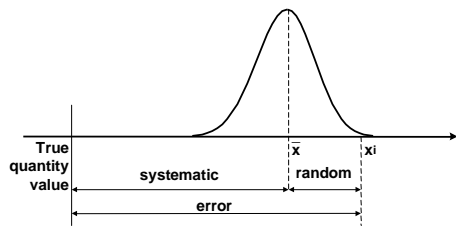
- Measurement – **process of experimentally obtaining one or more quantity values that can reasonably be attributed to a quantity**
- Measurand – **quantity intended to be measured**
- Measurement error – **measured quantity value minus a reference quantity value**
- Uncertainty – **non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used**

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Measurement errors

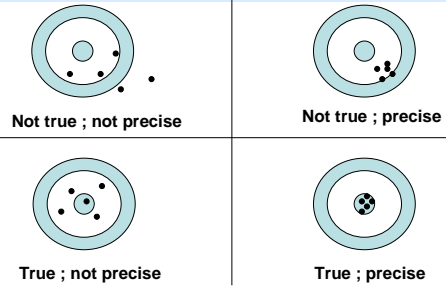
Systematic and random measurement error



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Measurement trueness and precision



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VIM definition : calibration

Operation that, under specified conditions,

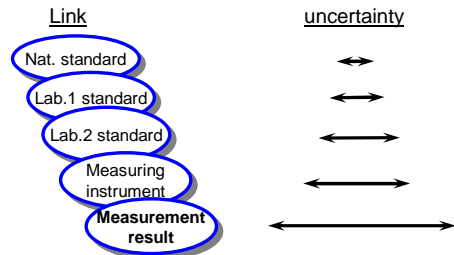
- in a first step, establishes a relation between
 - the quantity values with measurement uncertainties provided by measurement standards
 - and corresponding indications with associated measurement uncertainties
- and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication

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VIM definition : traceability of measurements

Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty



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Metrological confirmation

« Ensures that the metrological characteristics of the measuring equipment satisfy the metrological requirements for the measurement process. Metrological confirmation comprises measuring equipment calibration and verification. »

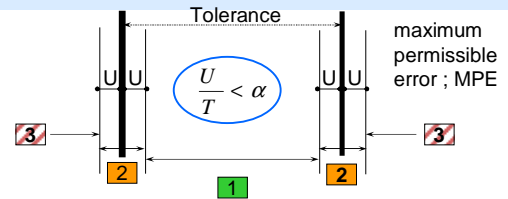
Metrological confirmation :

- Intervals between confirmation
- Equipment adjustment control
- Records of the metrological confirmation process

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Measurement process : design & realization



Conformity Assessment :

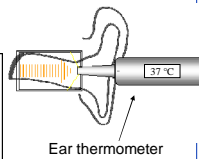
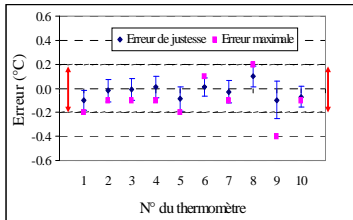
- 1 conformity to the specification is proved
- 2 decision implies a risk
- 3 Non-conformity to the specification is proved

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Example : clinical ear thermometers

10 thermometers calibrated @ 37,5 °C



Ear thermometer

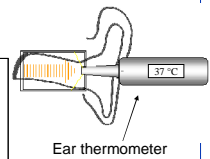
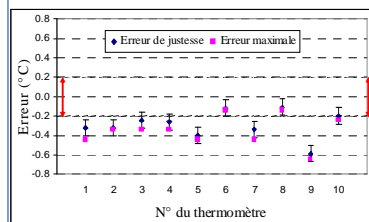
Conformity declared

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Example : clinical ear thermometers

10 thermometers calibrated @ 42 °C



Ear thermometer

Thermometers are not conform

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EUROLAB Cook Book

Today, the EUROLAB Cook Book series comprises the following documents which are ready for publication*:

- Validation of test and calibration methods
- Criteria for the selection of a proficiency testing scheme
- Use of interlaboratory comparison data by laboratories
- Handling of untestable samples
- Management review in laboratories
- Conflict handling within the accreditation process
- Competence of personnel
- Determination of conformance with specifications or limiting values with particular reference to measurement uncertainty – possible strategies



* available and downloadable from the member area of the website

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EUROLAB Cooperation Activities – an example

EURACHEM / CITAC / EUROLAB Joint Symposium on new developments in measurement uncertainty in chemical analysis

The Symposium with participants from 27 countries focused on two major topics:

- measurement uncertainty arising from sampling
- use of uncertainty information in compliance assessment.

Both topics are also subject of two EURACHEM / CITAC Guides which are available from the EURACHEM website (www.eurachem.org).

The lectures of this symposium are published on the website of EUROLAB-Germany (www.eurolab-d.bam.de).

New developments in measurement uncertainty in chemical analysis

Programme

Sampling uncertainty and Uncertainty for compliance assessment

Symposium at BAM, Berlin 15-16 April 2008 X BAM

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Top reading list on measurement uncertainty

eurolab TOP reading list on measurement uncertainty (version January 2007)

The TOP reading list on the topic of measurement uncertainty is intended to serve as a source of information on current research and recent publications. It is not an exhaustive list; added papers are highlighted. It will be updated frequently. Recommendations are welcome on additional papers to be added.

EUROLAB	TCQA	REFERENCE
Guide to the expression of uncertainty in measurement (GUM), corrected and reprinted	1995	Reference document on measurement uncertainty. Establishes general guidelines for evaluating and expressing measurement uncertainty and provides examples. Somewhat difficult to read (source: BNC, Geneva).
Quantifying uncertainty in analytical measurement: EURACHEM / CITAC Guide 2nd edition	2000	Very comprehensive guideline for practical evaluation of measurement uncertainty in chemistry. Many very good examples. Many good examples. (source: eurolab.org)
Practical application to our customers concerning the quality of measurements: U. Ottensmeyer, 10th Annual Meeting	2001	Useful for laboratory customers on the meaning of measurement uncertainty in practice (English version = g. under (source: eurolab.org))
Measurement uncertainty in testing: Eurachem Technical Report 2002	2002	A guide addressed to beginners. Stressing and promoting the possibility to use experimental data (source: eurolab.org)
EU guidelines on the expression of uncertainty in quantitative testing: EN 4538	2003	Guidance for accreditation and laboratories for implementation of uncertainty requirements under accreditation (source: eurolab.org)
Expressing Uncertainty in Testing (Spreadsheet): Keith 2003	2003	Spreadsheet for uncertainty evaluation, downloadable for free (source: eurolab.org)
Methods for calculation of measurement uncertainty in environmental laboratories, edition 2, Horizontal Technical Report EUR 1	2004	Click back on free to estimate measurement uncertainty from experimental data. Easy to read, example-based (source: eurolab.org)
ISO/IEC 17025 - Guide to the use of repeatability, reproducibility and business addresses in measurement uncertainty	2004	Technical specification on the use of method performance data determined by interlaboratory comparison for the estimation of measurement uncertainty. (BNC, Geneva)
Guide to the evaluation of measurement uncertainty for quantitative test results: EURACHEM / Technical Report 2004	2004	Comprehensive technical guide for more experienced users. Provides a survey on both the usability and the required approach (source: eurolab.org)
Use of uncertainty: ISO/IEC 17025 - 0: compliance assessment, IAF/ILAC/IRAP guidance note	2006	Introductory paper on the way how measurement uncertainty can be taken into account when deciding on compliance with specifications (to be published under eurolab.org)

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Conclusive statement

- Within conformity assessment bodies, the objective is to perform tests and measurements that :
 - ✓ Are reliable
 - ✓ Are useful and relevant
 - ✓ Enable making good decisions
- In general, optimizing the measurement process leads to the economical efficiency !
- EUROLAB and TCQA is facilitating routine activities of laboratory practitioners in developing supportive technical documents to meet these objectives so far...

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Thank you for your attention!



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