

Eurachem
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Eurachem guidance for Measurement Uncertainty

S Ellison

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Measurement uncertainty and the measurement cycle

Decide

Specify requirement

Choose method and validate

Control

Measure

Sample

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Eurachem measurement uncertainty guides

The image displays four overlapping book covers from the Eurachem measurement uncertainty guides series. Each cover features the Eurachem and CITAC logos at the top. The covers are:

- Quantifying Uncertainty in Analytical Measurement** (Third Edition, EURACHEM / CITAC Guide CG 4, 03/08/2012/1)
- Measurement uncertainty arising from sampling** (Second Edition 2019, EURACHEM / CITAC Guide, A guide to methods and approaches, Produced jointly with Eurolab, Nordtest, and RSC Analytical Methods Committee)
- Use of uncertainty information in compliance assessment** (First Edition 2007, EURACHEM / CITAC Guide)
- Setting and Using Target Uncertainty in Chemical Measurement** (EURACHEM / CITAC Guide, 01/04/2015)

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Quantifying Uncertainty in Analytical Measurement

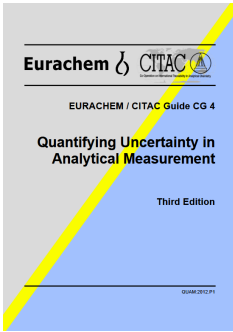
The image shows the cover of the book 'Quantifying Uncertainty in Analytical Measurement', Third Edition, EURACHEM / CITAC Guide CG 4, 03/08/2012/1. The cover features the Eurachem and CITAC logos and a blue diagonal design element.

- First published 1995
 - Close implementation of the GUM
 - Error propagation basis
 - Examples from chemical measurement
 - Extensive list of typical uncertainties included

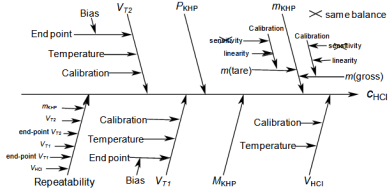
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Quantifying Uncertainty in Analytical Measurement



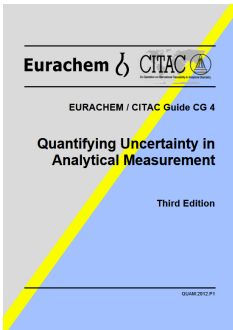
- Second edition 2000
 - Introduced use of validation data
 - Used ‘cause and effect analysis’ to identify uncertainty sources
 - Included simple spreadsheet approach



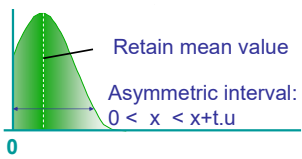
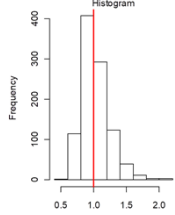
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Quantifying Uncertainty in Analytical Measurement



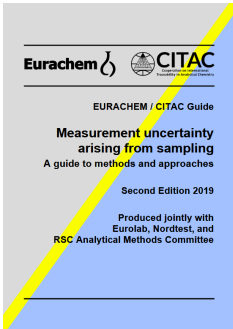
- Third edition 2011 (current)
 - Added improved consideration near detection limits
 - Includes Monte Carlo simulation
 - Referred to compliance guide for detail on conformity

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Measurement uncertainty arising from sampling

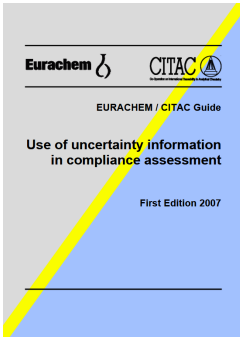


- First published 2007
 - First guide to include sampling as a source of uncertainty
 - Included Guy particulate theory and a practical “duplicate method”
- Updated 2019
 - Improved handling of skewed distributions
 - Added ‘uncertainty factor’

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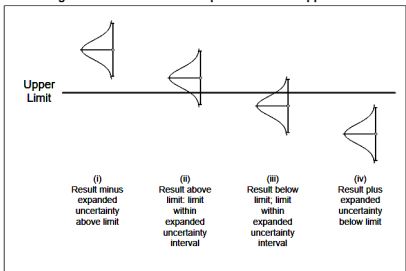
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Use of uncertainty information in compliance assessment



- Published in 2007
 - Extended guidance on conformity assessment

Figure 1 Assessment of Compliance with an Upper Limit



(i) Result minus expanded uncertainty above limit

(ii) Result above limit, limit within expanded uncertainty interval

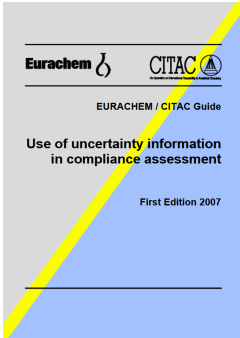
(iii) Result below limit, limit within expanded uncertainty interval

(iv) Result plus expanded uncertainty below limit

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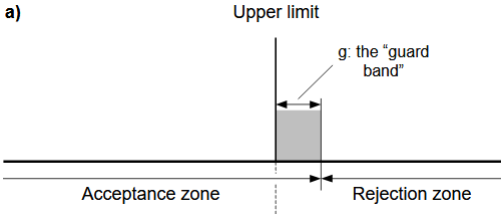
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Use of uncertainty information in compliance assessment



- Published in 2007
 - Extended guidance on conformity assessment
 - Introduced “decision rules”
 - Introduced guard-bands

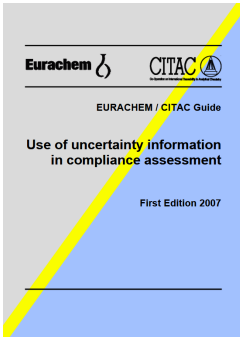
a)



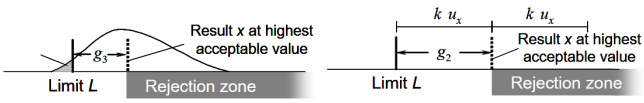
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Use of uncertainty information in compliance assessment



- Published in 2007
 - Extended guidance on conformity assessment
 - Introduced “decision rules”
 - Introduced guard-bands
 - Considered variable uncertainty



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Setting and using target measurement uncertainty

- Published 2015
 - Introduces and discusses target measurement uncertainty
 - Provides options for setting target uncertainty
 - Shows how target uncertainty is relevant to validation

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Additional information - Information leaflets

Information and additional guidance on technical issues

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Measurement uncertainty and the measurement cycle

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EURACHEM / CITAC Guide

Use of uncertainty information in compliance assessment

Decide

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EURACHEM / CITAC Guide

Setting and Using Target Uncertainty in Chemical Measurement

Specify

Eurachem **CITAC**

EURACHEM / CITAC Guide CG 4

Quantifying Uncertainty in Analytical Measurement

Measure

Eurachem **CITAC**

EURACHEM / CITAC Guide

Measurement uncertainty arising from sampling
A guide to methods and approaches

Sample

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Summary

- Measurement uncertainty matters
 - from specification to decision
- Four Eurachem guides
 - Setting target measurement uncertainty
 - Quantifying uncertainty
 - Uncertainty from sampling
 - Uncertainty in conformity assessment
- Additional information in leaflets

All Guides are available free of charge from www.eurachem.org and several translations are available at national Eurachem websites.

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