

Template for Eurachem Guides

A Guide for Guide Editors

Third Edition 2022

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Third edition (2022)

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**At time of document approval*

Acknowledgements

This edition has been produced by a Eurachem ad hoc Working Group with the composition shown (right). The editors are grateful to all these individuals and organisations, and to Vicki Barwick LGC (UK) and others who have contributed comments, advice and assistance.

Citation

This publication should be cited[†] as: “B. Magnusson, S. L. R. Ellison and U. Örnemark (eds.) Eurachem Guide: Template for Eurachem Guides – A Guide for Guide Editors (3rd ed. 2022). ISBN xxxx. Available from www.eurachem.org.”

[†]*Subject to journal requirements*

Template for Eurachem Guides - A Guide for Guide editors

English edition

Third edition 2022

ISBN xxxx

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Foreword

Eurachem guides have been developed over a long period of time but the format of different guides has varied. After a proposal from B. Magnusson in 2014, the Eurachem Executive Committee decided that a non-mandatory template should be developed, giving guidance on the format of all parts of the guide. A template for leaflets was published in 2019.

This Guide is provided in such a way that it serves as an example of the guidance that it provides.

In this document, “should” indicates a recommendation which is to be followed unless there is good reason not to, “may” indicates a permitted action or option, and “can” indicates a possibility without implying a requirement.

The major change in this third edition is an additional detailed recommendation on the use of symbols in Annex E.

Symbols and abbreviations

The following symbols and abbreviations occur frequently in this guide. Other symbols and abbreviations are defined on first use.

Abbreviations

BIPM	International Bureau of Weights and Measures
CITAC	Cooperation on International Traceability in Analytical Chemistry
GUM	Guide to the Expression of Uncertainty in Measurement
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IEC	International Electrotechnical Commission
ISBN	International Standard Book Number
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
JCGM	Joint Committee for Guides in Metrology
MS	Microsoft
pt	Point (as in font size)
VIM	International Vocabulary of Metrology

Symbols

u_{temp}	Uncertainty component due to variation in temperature
u_c	Combined standard uncertainty
u_i	Standard uncertainty for component i

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1 Introduction

Guides published by Eurachem should be easy to read, clear and unambiguous. To achieve these objectives, a Guide should:

- be as complete as necessary within the limits specified by its scope;
- be consistent and clear;
- be comprehensible to qualified persons who have not participated in its preparation;
- take into account the principles for the drafting of documents – see Eurachem procedure for the development of Guides [1].

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2 Scope

The aim of this document is to provide a template to assist authors drafting new guidance and revising current guidance. This template applies to Eurachem Guides and Supplements.

This template is not mandatory but contains recommendations for the style and structure of Eurachem guides. This version of the template is written in Microsoft Word.

The template is based on the ISO/IEC Directives, Part 2, Rules for the structures and drafting of International Standards [2]. Similar guides are published by companies [3], metrology institutes [4] and national standardisation bodies [5].

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3 General format of a Eurachem Guide

3.1 Language

The language in the English version of Eurachem Guides is UK English spelled according to, e.g. the *Concise Oxford Dictionary* [6].

Table 1 – Examples of preferred spelling

Preferred	Not recommended
Centre	Center
Characterisation	Characterization
Colour	Color
Programme	Program
Analyse	Analyze

3.2 Expression of recommendations

Editors should note that in International Standards, the conventions in Table 2 are common. Eurachem guidance documents are normally intended as recommended practice or options; they rarely contain mandatory requirements. Editors should accordingly avoid the use of “shall”, or equivalent wording in Eurachem guidance (unless citing a requirement in a standard), as this will often be read as a mandatory action.

Where a Eurachem guidance document intentionally adopts the conventions in Table 2, the conventions should be stated in the Foreword or other prominent location.

Further information on preferred terminology for some concepts is provided in Annex D.

3.3 Page layout

Other than the Foreword and the Introduction, if any, text is laid out in two columns in the published version of Guides. Level 1 headings (for main sections) are on a new page across two columns. In MS Word this requires a section break before and after each Level 1 heading.

If two columns do not fill a page, both columns should end at about the same level on the page. An example is given in Section 2 “Scope”.

3.4 Page numbering

For the main text after the Contents page, the page number is placed at the bottom right corner and is prefixed with the word Page, starting with page number 1 on the right-hand page. Before the main text, page numbering starts on the Foreword page with Roman numerals in lower case placed at the bottom of the page and centred.

3.5 Paragraph numbering

When it is necessary to refer to single paragraphs in the Guide, numbering of paragraphs is recommended.

3.6 Authors and their affiliations

The names of authors should be given in alphabetical order of surnames with the format shown on the title page in this Guide.

Editors, where identified, should be listed separately from other authors.

The affiliation after the author’s name may be the author’s employer or, where appropriate, the name of the relevant liaison organisation. For authors

Table 2 – Verbal forms commonly used in International Standards

Type of expression	Term	Remark
Requirement	shall, must	Mandatory for compliance with a document
Recommendation	should	Recommended practice considered particularly suitable, to be followed unless there is good reason for an alternative action
Permission	may	An action which is permitted but not required or especially recommended
Possibility	can, might	An action or event that could in principle occur

contributing as individual experts, the hometown is given. The country code after the author's affiliation should be the two-letter code defined in ISO 3166-1 [7].

Authors may also be grouped according to representation, for example in the case of joint working groups.

A recommendation for citation of the Guide should be given on the title page. It should include the ISBN if available. See, e.g. Annex A.2.

Examples of editor, author and contributor lists for some common circumstances are shown in Annex A.

3.7 Text format

3.7.1 Body text

The body text (style Normal, single line spacing) is given in Times New Roman 11 point (pt) with two columns, with space 0.6 cm between columns. The font is chosen to be the same as the default in the current Word equation editor which is used for mathematical formulas.

Text in paragraphs is justified. Justifying extends each line of the text to the left and right margins.

The space after a paragraph is normally 6 pt. A multi-line paragraph should not begin or end with just one line on a page – at least two lines should appear on each page.

At the top of a page the body text in the right column should be in line with body text in the left column. If there is a heading at the top of the left column the body text at the top of the right column will start lower to be in line with the text in the left column.

3.7.2 Headings

3.7.2.1 Use of headings

Headings should be used as necessary to separate and identify text under specific topics.

If any subheadings are used within a headed section, all subsections within that section should have separate headings. In particular, the first section in a section containing subheadings should also have a subheading so that it can be uniquely referenced. An example can be found in Section 3.2 which contains two subheadings, numbered 3.2.1 and 3.2.2 respectively.

3.7.2.2 Heading format

Headings are given in font Arial and the font size depends on the heading level:

- Heading level 1: 14 pt bold, centred on page margins, over two columns, starts on top of a new page, preferably on an odd (right hand) page number;
- Heading level 2: 13 pt bold;
- Heading level 3: 12 pt bold;
- Heading level 4: 11 pt bold.

Headings are numbered consecutively according to their levels such as, 1, 1.1, 1.1.1 and 1.1.1.1. A list style is used to define the numbered headings. The main heading for the sections Foreword, Symbols and abbreviations, Annexes, and the Bibliography has the same format as heading level 1 but without numbering.

Annexes should be designated by Roman letters (Annex A, B etc) Subheadings in annexes are formatted similarly to the corresponding heading levels in the body text, but the heading number should be preceded with the Annex letter code (A1, A1.1 etc).

Headings of level 1 and 2 should normally appear in the Table of Contents. Further subdivision (levels 3 or more) may be given where this does not make the length of the table excessive. The subheadings of annexes do not normally appear in the Table of Contents unless annex subdivisions extend over several pages.

Normally only the first word in a heading should begin with a capital letter. In the full title of a Guide all important words begin with a capital letter as in the title of this Guide: Template for Eurachem Guides – A Guide for Guide Editors.

The page header is in Times New Roman bold 12 pt (upright) and the footer is in Times New Roman 9 pt.

The headline of the Table of Contents is in Arial 14 pt bold. The section headings in the Table of Contents are as follows: Level 1 headings Arial 11 pt bold italics with space before 8 pt and space after 4 pt; level 2 in Arial 11 pt; and level 3 in Arial 10 pt.

3.7.3 Notes, footnotes and endnotes

A note should be preceded by the word 'NOTE'. If there is more than one note in the same paragraph, they should be numbered using Arabic numerals.

Footnotes should be indicated with superscript symbols (* ...) placed at the bottom of the page. The same symbol may be re-used on different pages.

Endnotes (i.e. bibliographic references) should be indicated consecutively with cross-references to the numbered list in the section “Bibliography” and placed inside square brackets [] placed on the line and before any punctuation.

3.8 Terms and definitions

Terms and their definitions should primarily be those published by international bodies, such as ISO and IUPAC. The VIM [8] and the GUM [9] and the documents prepared by JCGM Working Group 1, are the prime references for fundamental concepts related to measurement and measurement uncertainty. Other useful references are:

- ISO Guide 30 for reference materials [10];
- ISO/IEC 17000 for conformity assessment [11];
- ISO 9000 for quality management systems [12];
- IUPAC ‘colour (color) books’ for analytical chemical terminology (www.iupac.org) [13, 14];
- ISO/IEC 17043 [15] and ISO 13528 [16] for proficiency testing.

The most recently published version of terms and definitions should normally be used. If an older definition is used, the guidance document should explain the difference and the rationale for the choice. For additional information on terminology used in most Eurachem guidance see Annex D.

3.9 Symbols and abbreviations

Frequently used symbols and abbreviations should be included in an easily referenced list of definitions, either directly after the Foreword (as in this document) or in an Annex. Symbols and abbreviations may be given in separate lists. Each list should be in alphabetical order. Symbols and abbreviations used only within a single sub section may be defined in the text immediately preceding or following the first use, or may, at the editors' discretion, be included in the list.

NOTE: For shorter guidance, a list of symbols and abbreviations might not be necessary.

A list of symbols and abbreviations should be preceded by a statement explaining whether it is partial or complete. The following wording is recommended:

- a) Where only frequently used symbols and abbreviations are included in the list:
“The following symbols and abbreviations occur frequently in this guide. Other symbols and abbreviations are defined on first use.”
- b) Where the list contains all symbols and abbreviations used:
“The following symbols and abbreviations occur in this guide.”

NOTE: This page is intentionally blank.

4 Formulas, numbers, quantities and units

4.1 Mathematical formulas

Mathematical symbols and formulae should follow the guidance in Annex E.

Formulae that are referred to in the text should be numbered sequentially in parentheses as in Equation (1) below.

$$u(f_{\text{temp}}) = 0.1/\sqrt{3} = 0.06 \text{ } ^\circ\text{C} \quad (1)$$

Numbering for formulae in Annexes should recommence at 1 and include a letter designating the Annex, e.g. A.2.

A subscript is given in Roman (upright) font, e.g. s_{R} , unless it is a symbol of a quantity itself; in Equation (2) the subscript 'c' (in Roman) denotes 'combined', whereas the italic subscript 'i' denotes a variable index.

$$u_c^2 = \sum_{i=1}^n u_i^2 \quad (2)$$

4.2 Numbers

4.2.1 Expression of numbers

Express numbers in the same font and size as surrounding text (usually Times New Roman 11 pt). Examples are given in Table 3.

The decimal marker should be the form most commonly used for the language of the document. For UK English the decimal marker is a point on the line.

Long numbers are structured in groups of 3 digits as shown in Table 3 (as counted away from the decimal marker) using a short non-breaking space* (also called an 'en space'). A 4-digit number may be written without a separator, e.g. '4004'.

Intervals should be given as follows: '10 – 50', '10 mL – 50 mL' using an 'en dash'† with non-breaking spaces.

4.2.2 Reporting results

Although Eurachem Guides do not usually report measurement results, they often include illustrative examples. These should demonstrate good practice in reporting.

Table 3 — Examples of expression of numbers (UK English)

Preferred	Not acceptable	Remark
16.78	16,78	The decimal marker is the point on the line
43 279	43,279	A short non-breaking space* is used as a thousand separator
0.143 567	0.143567	A short non-breaking space* is used as a separator in long numbers
25 × 60.5	25 · 60.5	When the decimal marker is the point on the line, the multiplication sign should be an '×'
* CTRL+SHIFT+SPACE in MS Word		
NOTE In ISO documents, the decimal marker is a comma on the line.		

Mean values, measures of precision and uncertainties, should be reported with a sensible number of digits. Standard deviations are generally not reported to more than two significant digits unless more are needed to avoid rounding errors in intermediate calculations. Mean values and relative standard deviations should be rounded to be consistent (same number of decimal places) with the standard deviation.

Final measurement results (y) and expanded uncertainties (U) should be reported in the same units and in the format $y \pm U$. The unit could be stated once, (523 ± 17) µg or twice, 523 µg ± 17 µg. Different units should be avoided, e.g. the format '523 µg ± 3 %' is discouraged.

According to GUM the expanded uncertainty should not be given with more than two significant digits and the coverage factor k (usually 2) is always to be stated.

* CTRL+SHIFT+SPACE in MS Word

† CTRL+MINUS (numeric keypad) in MS Word

The result should be rounded and presented with the same number of decimal places as the expanded uncertainty.

4.3 Quantities and units

4.3.1 General

ISO 80000-1:2009 [17] gives general information and definitions concerning quantities, systems of quantities, units, quantity and unit symbols, and coherent unit systems, especially the International System of Quantities, ISQ, and the International System of Units, SI. Examples of expression of units are given in Table 4.

Table 4 – Examples of expression of units (UK English)

Preferred	Not acceptable	Remark
mg L ⁻¹	mg/L	Multiplication sign: A space is recommended between units
50 g; 25 °C; 5 %	50g; 25°C; 5%	Non-breaking space* between value and unit
L	l	For unit litre
5 m	five m	
s	Sec	
min	Mins	
h	Hrs	

The full name of a unit may be given in descriptive text when small numbers are given in words; for example, ‘five metres’ may be used instead of ‘5 m’.

Quantity symbols for lengths, concentrations etc. should be written in Times New Roman italics (*m*, *c*, *U*, *u*, *k* ...) with units in regular (Roman) type (kg, mol, mL,...).

Examples:

$m = 10 \text{ kg}$ where *m* is a mass;

$c = 12.3 \text{ mol L}^{-1}$ where *c* is a concentration.

Write symbols for chemical elements and chemical formulas in Times New Roman regular type, including any indices, e.g. ²⁰⁸Pb, BaSO₄.

The unit-prefix or power of ten should be so chosen to give numerical values in the range 0.1 to 999, e.g. write, $c = 123 \text{ mg L}^{-1}$ instead of $c = 123\,000 \text{ } \mu\text{g L}^{-1}$.

4.3.2 Quantities describing composition of mixtures

In Eurachem guides, when the text describes general features of laboratory work, quantities are often used in a generic sense (unqualified) or even omitted. Examples are:

- ‘The customer wished to know the content of copper in the water sample’;
- ‘The laboratory has developed a new method for determination of serum albumin concentration’;
- ‘The amount of protein requested for the analysis proved insufficient’.

However, in situations where the focus is on metrological aspects, e.g. in specifying the measurand during uncertainty evaluation, or depicting links in a specific metrological traceability chain, or when drawing up a protocol for an interlaboratory comparison, any quantity of interest must be specified in sufficient detail.

When describing the composition of mixtures use the name and appropriate symbol (Table 5). Concentrations are quantities describing the ratio of one of the quantities of a single substance (mass, volume, chemical amount or number of entities) to the total volume of the mixture.

Abbreviations such as ppm, ppb and ppt can have different meanings and should not be used.† Preferably use instead, e.g. mg kg⁻¹, mol L⁻¹ etc.

Abbreviations such as ‘*m/m*’, ‘*w/w*’ and ‘*V/V*’ should not be used to identify the measured quantity because they can have different meanings. Write instead ‘mass fraction’, ‘volume fraction’ etc. and use the recommended symbols from Table 5.

The per cent (%) and per mille (‰) symbols are not sufficient to describe a composition in a metrological context. Write e.g. ‘The mass fraction (%) is 2.5’.

The generic term ‘concentration’ may be used on its own in Eurachem Guides, i.e. unqualified, when a general term is required to represent the family of

* CTRL+SHIFT+ SPACE in MS Word

† The abbreviation ppt is sometimes used for both ‘parts per thousand’ and ‘parts per trillion’

Table 5 – Examples of names, symbols, definitions and units for quantities describing composition of mixtures

Name	Symbol	Definition	SI unit	Common unit
Mass concentration	ρ_i	$\rho_i = \frac{m_i}{V}$	kg m ⁻³	g L ⁻¹
Amount of substance concentration	c_i	$c_i = \frac{n_i}{V}$	mol m ³	mol L ⁻¹ mol dm ⁻³
Number concentration	C_i	$C_i = \frac{N_i}{V}$	m ⁻³	cm ⁻³
Mass fraction	w_i	$w_i = \frac{m_i}{m}$	1	%
Volume fraction	φ_i	$\varphi_i = \frac{V_i}{V_0}$	1	%
Amount of substance fraction	x_i	$x_i = \frac{n_i}{n}$	1	%
NOTE 1 Subscripts <i>i</i> refer to components <i>i</i> of the mixture. Example: mass fraction of substance B – w_B or $w(B)$.				
NOTE 2 The recommendations in this Table follow the general principles given in ISO 80000-1:2009, Quantities and units – Part 1: General [17].				

terms which includes mass concentration, amount of substance concentration and number concentration.

The generic term ‘content’ may be used on its own in Eurachem Guides, i.e. unqualified, when a general term is required to represent the family of terms which includes mass fraction, amount of substance fraction etc.

When giving instructions on how to prepare samples or make dilutions, do not write ‘dilute 10:100’ or ‘dilute 10/100’. Write instead ‘dilute 10 mL to 100 mL’ or mix 10 mL of A with 90 mL of B’.

Do not mix symbols and names of units or quantities (see Table 6).

Table 6 – Examples of mixing symbols and names of units

Preferred	Not recommended
The concentration of Pb is 5 ng L ⁻¹	5 ng Pb L ⁻¹
km h ⁻¹ kilometres per hour	km per hour

NOTE: This page is intentionally empty.

5 Tables and figures

5.1 General

Tables and figures should be used when they are the most efficient means of presenting information in an easily comprehensible form. It must be possible for the reader to understand the information in a table or figure without consulting other parts of the Guide. The same information should not be presented in both a table and a figure.

Tables and figures are numbered consecutively as they are addressed in the text. Tables and figures should be accompanied by a title that provides sufficient information about the respective content. The title should be centred and in bold 11 pt Times New Roman. The title is not followed by a full stop.

Any figure or table covering two columns should be placed at the top or bottom of the page.

5.2 Tables

Tables should be designated ‘Table’ and numbered with Arabic numerals, beginning with 1. In annexes tables should be numbered separately, e.g. Annex A – Table A1, Table A2 etc.

Any notes or footnotes should be located within the frame of the table. A table within a table and subdivision of a table is not recommended.

Example of outline of a table is shown in Table 7:

Table 7 – Combined standard uncertainty for the determination of crude fibre in animal feeding stuffs

Fibre content (g/100 g)	Standard uncertainty (g/100 g)
2.5	0.31
5	0.4
10	0.6
NOTE The fibre content and the corresponding standard uncertainty are expressed as mass fractions.	

5.3 Figures

Figures should be designated ‘Figure’ and numbered with Arabic numerals, beginning with 1 and placed below the Figure.

Figures in annexes should be numbered from 1 according to their Annex designation, e.g. for Annex A – ‘Figure A1’, ‘Figure A2’ etc.

Examples of outline of figures are shown in Figure 1 and Figure 2:

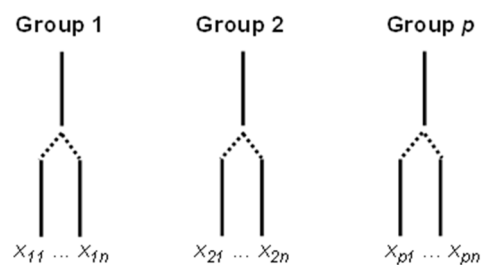


Figure 1 – Example of a ‘nested design’ for an experiment from which different precision measures can be evaluated using ANOVA

The format of axes labels in figures should be consistent throughout the document. Use either of the following two options:

- 1) ‘Quantity (unit)’, for example Mass concentration (mg L⁻¹). An example is shown in Figure 2.
- 2) ‘Quantity/unit’, for example Wavelength/nm, Temperature/K etc. This is the metrological option recommended, e.g. by the BIPM. The character ‘/’ is a division sign. It forms part of an equation together with the number on the axis. Example: ‘Mass/kg = 1.5’.

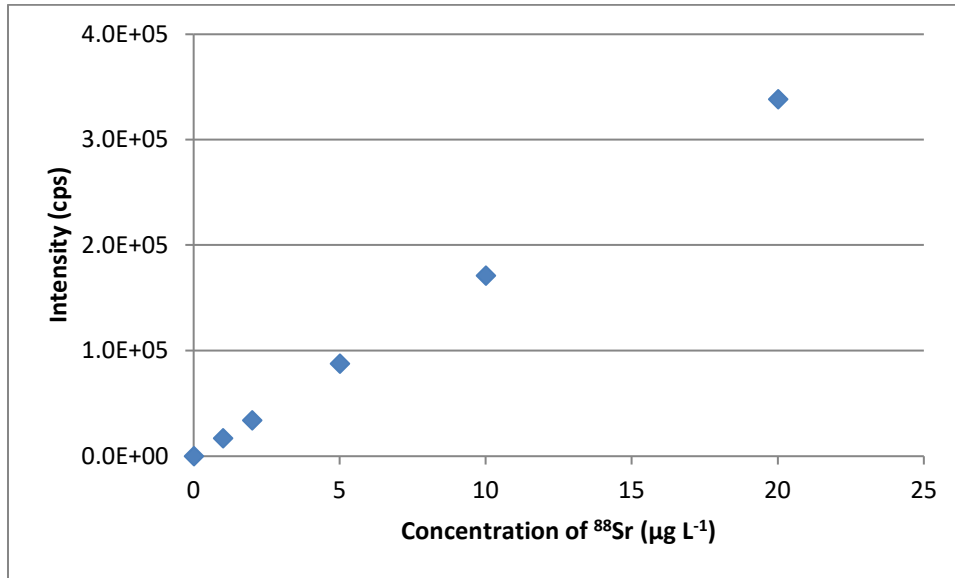


Figure 2 — Calibration curve for strontium with ICP-MS. Intensity versus concentration of strontium measured at mass 88

6 Lists

6.1 Construction of lists

Lists should be introduced by:

- a) a sentence;
- b) a complete grammatical proposition followed by a colon; or
- c) the first part of a proposition.

Lists, whether ordered or otherwise, should normally be left-aligned to the starting point of the introductory paragraph (including paragraph number, if any). For example:

Preferred list alignment:

- item 1;
- item 2.

Not recommended:

- item 1;
- item 2.

6.2 Unordered lists

Lists without numbering or other ordering are common for separating points which have no special priority order, and for which there is no need to refer to separate items. Each item in an unordered list should be preceded by a bullet and terminated with a semicolon, except for the final list item which should be completed with a full stop.

As far as possible the format of ordered lists should be consistent within a document; that is, unordered lists should use only one of the above formats in any one guideline. An example is shown in 5.3 and below regarding fibre content:

The fibre content as a mass fraction in per cent, w_{fibre} , is given by:

$$w_{\text{fibre}} = \frac{(b-c) \times 100}{m} \quad (3)$$

where:

- m is the mass (g) of the sample. Approximately 1 g of sample is taken for analysis;
- b is the loss of mass (g) during ashing of the sample;
- c is the loss of mass (g) during ashing of a blank.

6.3 Ordered lists

Ordered lists are used where there is an important priority order for different items or where there is a need to refer to individual items from elsewhere in the text. Each item in an ordered list should be preceded by:

- an Arabic numeral (1, 2, ...) followed by a full stop;
- a lower-case Roman numeral (i, ii, iii, ...) followed by a parenthesis; or
- a lower-case letter followed by a parenthesis.

As far as possible the format of ordered lists should be consistent within a document; that is, ordered lists should use only one of the above formats in any one guideline.

6.4 Multilevel lists

A multilevel list includes a number of items each of which is itself a list. A multilevel list may be any combination of ordered and unordered lists.

Where a multilevel list requires two levels of ordering the list identifiers should not be the same for both levels. For example:

- i) item 1
 - a) sub-category 1;
 - b) sub-category 2.

is preferred to

- i) item 1
 - i) sub-category 1;
 - ii) sub-category 2.

Sub-categories in multilevel lists should be indented (as above) so that the structure of the list is easily visible.

In other respects, the choice of list identifiers and format is at the discretion of the editor, bearing in mind the formats chosen for simple ordered and unordered lists in the remainder of the document.

Note that for unordered multilevel lists, solid bullet markers (•, ▪) usually stand out more than leading dashes (-) and are therefore more likely to be suitable as the top-level marker in multilevel lists.

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7 Simplifying editing and revision

7.1 Using styles

It is recommended to use the styles for body text (Normal) and heading and figure captions used in this template. In order not to create new styles for all changes the automatic style creation should be turned off in Word.

7.2 Use of automatic numbering

The headings, captions for figures, tables, formulas, footnotes, and bibliography (references) are set up with automatic numbering. It is recommended to use that throughout the document.

The literature references in this Guide are managed using a numbered list. A reference in the text [xx] is inserted using cross reference to the numbered item in the list.

7.3 Use of cross-referencing

Use bookmarks to simplify cross-referencing when there is no built-in numbering style.

When referencing to a particular heading, table, figure, equation, literature reference etc. the object should start with a capital letter. Examples: ‘See Table 4’; ‘As shown in Figure 2...’; ‘Equation (1) contains...’.

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8 Empty section

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Annex A – Examples of lists of editors, authors and contributors

Example 1 – a Eurachem Guide

The title page of this Guide shows one example of title page layout for a Eurachem Guide.

In many Eurachem guides, the information on the title page is presented with two columns as below.

2nd Edition in English (2019)

Editors

S L R Ellison (LGC, UK)
A Williams (UK)

Composition of the Working Group*

S Ellison <i>Chair</i>	LGC, Teddington (UK)
B Magnusson <i>Secretary</i>	Trollboken AB (SE)
R Bettencourt da Silva	Univ. Lisboa (PT)
W Bremser	BAM (DE)
A Brzyski	Eurachem (PL)
E Christie	Eurachem (IE)
R Kaarls	(NL)
R Kaus	Eurolab (DE)
I Kuselman	CITAC (IL)
I Leito	Univ Tartu, (ES)
O Levborg	Ukrmetteststandart (UA)
R Macarthur	FERA (UK)
P Pablo Morillas	EUROLAB-España (ES)
F Pennecchi	CITAC (IT)
T Naykki	SYKE (FI)
P Yolcu Omeroglu	Eurachem (TR)
O Pellegrino	IPQ/DMET (PT)
M Rösslein	EMPA St. Gallen (CH)
P Robouch	JRC (EU)
E Sahlin	RISE (SE)
A Van der Veen	NMI, (NL)
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A Williams	(UK)
R Wood	RSC (UK)

*At time of document approval

Acknowledgements

This edition has been produced primarily by a joint Eurachem/CITAC Working Group with the composition shown (right). The editors are grateful to all these individuals and organisations and to others who have contributed comments, advice and assistance.

Production of this Guide was in part supported under contract with the UK Department for Business, Energy & Industrial Strategy as part of the Chemical and Biological Metrology Programme.

Citation

This publication should be cited as follows*:

S L R Ellison and A Williams (Eds) Eurachem/CITAC Guide: Metrological Traceability in Analytical measurement (2nd ed. 2019). ISBN: 978-0-948926-34-1. Available from www.eurachem.org.

*Subject to journal requirements

Example 2 – a joint Eurachem Guide

This example follows the rules in this Guide showing all organisations.

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This publication should be cited* as: “M H Ramsey and S L R Ellison (eds.) Eurachem/EUROLAB/CITAC/Nordtest/AMC Guide: *Measurement uncertainty arising from sampling: a guide to methods and approaches Eurachem* (2007). ISBN 978 0 948926 26 6. Available from www.eurachem.org”

Annex B – Cover and logo use for joint guides

Eurachem/CITAC guides

Some Eurachem Guides are prepared together with CITAC and/or other organisations. See Eurachem *Quantifying Uncertainty in Analytical Measurement* (2012) for a typical cover, first page and back cover. Source files for previous joint guide covers can be obtained from the Eurachem Secretariat or from the respective Eurachem Working Group. For joint guides with CITAC, the current CITAC logo (right) should be used together with the Eurachem logo. The CITAC Secretary can provide alternative monochrome and colour formats, as well as a variant without strapline for use at reduced size on the title page.



Annex C – Examples of styles for bibliographic references

Eurachem guides

1. B. Magnusson and U. Örnemark (eds.) Eurachem Guide: The Fitness for Purpose of Analytical Methods – A Laboratory Guide to Method Validation and Related Topics, (2nd ed. 2014). Available from www.eurachem.org.

Joint Eurachem guides

2. S. L. R. Ellison, B. King, M. Rösslein, M. Salit, A. Williams (eds.) Eurachem/CITAC Guide: Traceability in Chemical Measurement – A guide to achieving comparable results in chemical measurement (2003). Available from www.eurachem.org and www.citac.cc.

Reports and guides

3. EUROLAB Technical Report 1/2006, Guide to the Evaluation of Measurement Uncertainty for Quantitative Test Results, EUROLAB (2006). Available from www.eurolab.org.
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5. Evaluation of measurement data – Supplement 1 to the “Guide to the expression of uncertainty in measurement” – Propagation of distributions using a Monte Carlo method, JCGM 101:2008, <http://www.bipm.org/> (also available as ISO/IEC Guide 98:3:2008/suppl 1:2008).

Articles in scientific journals

6. J. Kragten, Calculating standard deviations and confidence intervals with a universally applicable spreadsheet technique, *Analyst*, **119**, 2161-2166 (1994).

Standards

7. ISO Guide 33:2015, Reference Materials – Good practice in using reference materials. ISO, Geneva (2015).

Books

8. I. J. Good, Degree of Belief, in *Encyclopaedia of Statistical Sciences*, Vol. 2, Wiley, New York (1982).

Annex D – Current terminology

Following clause 3.8 above, Eurachem documents generally follow internationally accepted terminology. However, authors should also consider the intended audience for Eurachem guidance. For ease of understanding, authors may use terminology that is familiar to the intended audience in place of internationally defined terms that might be less familiar.

Where this is done, authors should explain the use of alternative terms and provide the corresponding international term in a note, glossary of terms or by other means. This may be done in the Foreword, in a Terminology section, or (where a term is not frequently used in a document) on first use of the more familiar term.

Example:

The 2019 edition of the guide on measurement uncertainty arising from sampling uses ‘concentration’ more generally than for molar concentration alone. The Terminology section includes the statement:

“In this guide, ... the term ‘concentration’, when unqualified, should be understood as applying to any of these different measures of proportion or amount. When the text requires a restricted interpretation, ‘concentration’ is qualified (for example as ‘amount of substance concentration’) or replaced with a more specific term (for example, ‘mass fraction’).”*

**Listed previously as “[for example] mass fraction, volume fraction, amount of substance (mole) fraction, and mass or amount-of-substance per unit volume”*

Examples of the use of familiar terminology in Eurachem guidance documents are given below:

- The document that describes the measurement process in detail is often referred to as a standard operating procedure (SOP), procedure, or method. In Eurachem guidance, the term **procedure** is preferred (the VIM term) but the term **method validation** and, where there is no risk of confusion, **method** may still be used since these

terms are widely applied in general use and also in International Standards;

- The quantity intended to be measured is often an amount of substance concentration, mass fraction, mass concentration etc. For Eurachem guidance, the term **concentration** may be used as a general term to avoid frequent repetition of a list of possible measurands (see Example above).

This use of familiar terms helps the effective dissemination of good analytical practice, while cross-reference to the corresponding internationally defined term helps the intended audience understand international terms that may be used in more general documents.

Where there is no widely accepted international term, it is useful to provide a short list of common alternatives on first use of a term or in a Terminology section.

Other preferred terms used in Eurachem guidance are given below:

- Uncertainty **estimation** is used rather than uncertainty evaluation or uncertainty quantification;
- Precision. For within-laboratory precision the term **intermediate precision** is recommended. Editors should note that it is often important to specify the particular conditions; for example, whether one or all instruments, operators etc. in the laboratory are used;
- In earlier documents the terms “rational method” and “empirical method” have been used, respectively, to describe the situations where the measurand is specified independently of any measurement procedure, or defined by reference to a specific documented procedure. Current usage refers to the measurand, rather than the procedure, and ISO Guide 35:2017 [18] introduced the defined term “operationally defined measurand” for the case where the measurand is defined by reference to a specific documented procedure. The term “**operationally defined [measurand]**” is therefore now preferred.

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Annex E – Use of symbols and equations in Eurachem Guides

E1 Lists of recommended use of symbols, subscripts and accents

Table E 1 Symbols commonly used

Symbol	Usual meaning
a	half-width of a rectangular distribution [when conformity with the GUM [9] is desirable]
b	coefficient in a polynomial or other linear equation (including first order) [with subscripts 0, 1, 2 ...] e.g. $y = b_0 + b_1x$
c	concentration (general usage) amount of substance concentration (in conjunction with other expressions of composition – see Table 5)
C	number concentration (in conjunction with other expressions of composition – see Table 5)
f	correction factor (with subscript)
k	coverage factor (in calculation of expanded uncertainty)
m	mass [Note 'm' preferred to 'w' for mass determined by weighing]
n	number of observations or other items
N	total number of observations Normal distribution, e.g. in $x \sim N(0,1)$ in statistics
p	probability (statistics) number of participants in an interlaboratory study (when conformity with ISO 5725 [19]) is desirable)
r	correlation coefficient (statistics) repeatability limit (following ISO 5725 [19]) repeatability (as subscript)
R	reproducibility limit (following ISO 5725 [19]) reproducibility (as subscript)
s	sample standard deviation
t	Student's t (statistics) [With subscripts; $t_{\alpha,\nu}$ denotes the upper $(1 - \alpha)$ quantile of the t distribution with ν degrees of freedom also, t_{crit} , t_{calc} for critical values and (if needed) calculated value]
u	standard uncertainty*
U	expanded uncertainty*
v	volume
x	an observed value (general use, but note GUM [9] restriction to input quantities in a measurement model) amount of substance fraction (in conjunction with other expressions of composition – see Table 5)
y	observed value (general use) measurement result [when conformity with the GUM [9] is desirable]
μ	population mean
σ	population standard deviation also σ^2 : variance
ν	degrees of freedom for a t or chi-squared distribution
δ	[capitalised] a difference [lower case] a small increment, usually in a particular variable (e.g. δx , δy)
\sim	distributed as
*Authors should additionally consult the GUM [9] for non-standard nomenclature specific to measurement uncertainty [$u(x_i)$, $u_i(y)$, $U(y)$ etc.]	

Table E 2 Subscripts

Subscript	Usual meaning
r	repeatability conditions [Roman (upright) script] ⁺
R	reproducibility conditions [Roman script] ⁺
I	intermediate precision conditions [Roman script] ⁺
<i>i, j, ...</i>	Index in a set of observations [Italic script] ⁺
NOTE: Subscripts may be separated by a comma, particularly when the subscripts include abbreviations	
⁺ See section E3 Typesetting	

Table E 3 Accents and diacritics

Accent/diacritic	Usual meaning
– (bar)	sample mean, usually over a set of observations
^ (“hat”)	usually denotes estimated value of a population parameter
’ (“prime”)	usually denotes a modified value, e.g. for relative <i>s</i> , <i>u</i> or <i>U</i> - <i>s</i> ’, <i>u</i> ’ or <i>U</i> ’
NOTE: In some cases a subscript may be more appropriate than using prime, particularly if a second superscript is required.	

E2 Use of symbols in formulas

Avoid abbreviations in formulas where possible. Use a single symbol (with a subscript if required). Do not use abbreviations to the right of an equals sign. However, commonly recognised abbreviations (e.g. LOD, LOQ, CV, RSD) may be used on the left of the equal sign.

Avoid using long words as subscripts to symbols – use abbreviations where possible.

E3 Typesetting

See Section 3 for rules on typesetting for symbols in formulas. Variables* are generally single-character, normal weight, italic script, with subscripts as needed for differentiating different instances. Subscripts are in Roman script unless the subscript is itself a variable. For example, in c_{Cd} (denoting a cadmium concentration), Cd is a single name rendered in Roman script.

However, in x_i , “*i*” is a variable intended to take multiple values (usually 1, 2... etc) and is rendered in italic script. Numerical subscripts follow the general rule for numbers and are consequently rendered in Roman script.

Create equations using a suitable equation editor (e.g. the MS Word equation editor or MathType). The font used for symbols and formulas should be consistent throughout a guide. The font used for symbols in the body text should match that used in formulas.

- The preferred font for symbols and formulas is Times, however Cambria Math (the default font for the MS Word equation editor) is also acceptable.
- If the MS Word equation editor is being used but Times Roman font is required, the free XITS font library can be used (<https://fontlibrary.org/en/font/xits-math>).

* GUM uses upper case for “quantities” (see SI brochure and IUPAC lower case for instances (values); in statistics, the same distinction is made for statistical variables and individual values (though the concept of

statistical variables does not map directly to that of quantities in quantity calculus). The GUM itself contains exceptions – notably *U*.

E4 Examples of equations

the structure and drafting of International Standards [2].

Here follows some common examples. For detailed guidance see ISO/IEC Directive Part 2 *Rules for*

Case #	Equations recommended	Equations not recommended*
1	$s_r = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n - 1}}$	$s_r = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n - 1}}$
2	$RSD_r = \frac{s_r}{\bar{x}}$	$s_r = \bar{x} \cdot RSD_r$
3	$CV_r = 100 \frac{s_r}{\bar{x}}$ $CV_r = 100 \frac{2}{20} = 10 \%$	$s_r = \frac{\bar{x} \cdot CV_r}{100}$
4	$\rho = \frac{m}{V}$	$\text{density} = \frac{\text{mass}}{\text{volume}}$
5	$v = 2 \times 5 r$	$v = 2 \cdot 5r = 10 r$
6	$t = \frac{S_{ME,i}}{S_{MR,i}}$	$t = \frac{MSE_i}{MSR_i}$
7	$y = b_0 + b_1 x$	$y = kx + l$
8	$u(f_{temp}) = 0.1/\sqrt{3} = 0.06 \text{ }^\circ\text{C}$	$u_{f_{temp}} = 0.1/\sqrt{3} = 0.06 \text{ }^\circ\text{C}$

*Issues to note are described below:

- case 1 – the subscript (r) should be in Roman rather than italic script and the subscript (i) should be in italic script;
- cases 2 and 3 – the use of abbreviations to the right of the equals sign is not recommended. Instead use subscripts or ‘ (‘prime’), e.g. RSD_r can be written as $s_{RSD,r}$ and CV_r can be defined as s'_r ;
- case 3 – with numerical values the 100 can be used as a multiplier when in front of 2/20, see further case 5;
- case 4 – descriptive terms or names of quantities should not be arranged in a form of an equation;
- case 5 – in an equation the multiplication sign \times should be used between numerical values to avoid confusion when the decimal separator is a point;
- case 6 – illustrates the use of separators between multiple subscripts if needed, rather than multiple letters in a symbol. Note that the symbol S in this context does not represent the sample standard deviation. The symbol S together with the subscripts should be defined in the text;
- case 7 – polynomial coefficients are usually numbered according to the term (b_0, b_1 etc);
- case 8 – illustrates the use of the form $u(x_i)$ used by the GUM and related documents.

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For updates to referenced guidance and for additional reading please refer to the Eurachem Reading List on the Eurachem website, www.eurachem.org.

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