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Date: 27 January 2025

Origin: International

Latest date for receipt of comments: 22 March 2025

Project No. 2023/02876

Responsible committee: CII/60 Surface chemical analysis

Interested committees:

Title: Draft BS ISO 24237 Surface chemical analysis — X-ray photoelectron spectroscopy — Repeatability and constancy of intensity scale.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 24237

Surface chemical analysis — X-ray photoelectron spectroscopy — Repeatability and constancy of intensity scale

*Analyse chimique des surfaces — Spectroscopie de photoélectrons
par rayons X — Répétabilité et constance de l'échelle d'intensité*

ICS: 71.040.40

ISO/TC 201/SC 7

Secretariat: **BSI**

Voting begins on:
2025-01-27

Voting terminates on:
2025-04-21

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 24237 was prepared by Technical Committee ISO/TC 201, *Surface chemical analysis*, Subcommittee SC 7, *X-ray photoelectron spectroscopy*.

This second edition cancels and replaces the first edition (ISO 24237:2005), of which it constitutes technical revisions and minor editorial revisions. The main changes to the previous edition are as follows:

- Introduction, 4th Paragraph: Insert "In light of the effect of the procedures described in the International Standard on reproducibility and reliability of data, proper and complete documentation practices should be promoted and encouraged. Two other ISO standards also address spectrometer intensity consistency. ISO 16129:2018 [19]- Surface chemical analysis — X-ray photoelectron spectroscopy — Procedures for assessing the day-to-day performance of an X-ray photoelectron spectrometer includes a rapid intensity scale check for an XPS spectrometer using Ag. More detailed checks of an XPS spectrometer instrument response function for monochromatic Al sources can be done using ISO 5861 Surface chemical analysis — X-ray photoelectron spectroscopy — Method of intensity calibration for quartz crystal monochromated Al K α XPS instruments.[18] An intensity check is usefully" after "scales of XPS instruments". Delete "This method may be" in last sentence

- 1 Scope, 1st Paragraph: Insert " It is only applicable to instruments that incorporate an ion gun for sputter cleaning. It is not intended to be a calibration of the intensity/energy response function. That calibration may be made using ISO 5861,[18] by a method recommended by the instrument manufacturer, or other documented approach." after first sentence

- 2: Add Clause of "2 Normative references", and adjust the subsequent clause numbers

- 3, Title : "Terms, definitions, symbols and abbreviated terms" replaces "Symbols and abbreviations"

Add "3.1 Terms and definitions", and adjust the subsequent clause numbers

For the purposes of this document, the terms and definitions given in ISO 18115 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>

- IEC Electropedia: available at <https://www.electropedia.org/>.

Keep clause "Symbols and abbreviations" as "3.2 Symbols and abbreviations"

- 3.2, U95(Pi): "relative uncertainty" replaces "uncertainty"

- 4: Combine 1st paragraph and 2nd paragraph of first edition as 1st paragraph of second edition.

- 4: Combine 3rd paragraph and 4th paragraph of first edition as 2nd paragraph of second edition.

— 4, 1st Paragraph: Delete “in context” in first sentence, “to obtain and prepare a copper reference foil in order” and “with the appropriate instrumental settings” in 2nd sentence, “These peaks are well established for this purpose and relevant reference data exist.” in 4th sentence. Add “on copper reference foil.” at end of 2nd Sentence. “preparing” replace “procuring” and delete “with the relevant subclause headings paraphrased.” in last sentence.

— 4, 2nd Paragraph: Move “Repeatabilities have contributions from the stability of the X ray source, the spectrometer detector and the electronic supplies, from the sensitivity of the measured peak intensity to the sample position and from the statistical noise at the peak. In the method, conditions are defined to ensure that the statistical noise at the measured intensities is relatively small. This is discussed in [Annex A](#).” as NOTE 1;

Move “The absolute values of the intensities of the two peaks are known for well-defined conditions and so, in principle, these two intensity values could be used to establish part of the spectrometer intensity/energy response function.^[2] However, these response functions may have a complex dependence on energy^[3] and so a determination of the intensities at two energies is insufficient. In this method, therefore, the scope is limited to evaluating the constancy of the intensity/energy response function as indicated by the constancy of the intensities at these two energies and of their ratio of intensities, within an uncertainty derived from the measurement repeatability.” as NOTE 2.

— 4, 5th Paragraph of first edition: The fifth paragraph of first edition move to the end of 5.7.2 and become as 5.7.3

— [Figure 1](#): Move [Figure 1](#) from [clause 5.1](#) to the end of [clause 4](#)

— [5.3.1](#): “O1s and C1s” replaces “the oxygen and carbon 1s”.

— [Figure 2](#), Key, Y: “intensity (cps, counts/s)” replaces “intensity /1000”

— [Figure 3](#), Key, b: “Tolerance limits” replaces “95 % tolerance limit”.

— [Figure 3](#), the explanation in parentheses, 2nd sentence: change “2003” to “2004”.

— [5.4](#), 1st Revise “...settings of pass energy, retardation ratio, slits, lens settings, etc.” as “...settings of X-ray incidence angle (from normal of sample), acquired photoelectron emission angle (from normal of sample), pass energy, retardation ratio, slits, lens settings, etc.”

— [5.8.2](#): Add “or Tougaard background” after “Shirley background” in 1st sentence, add “or Tougaard background” after “Shirley background” in 2nd sentence, insert 4th sentence “The end points for Tougaard background can be set same as that of Shirley background.”

— [5.10](#): Add “, or short interval if needed,” after “three months” in 1st sentence, add “If adjustments/actions must be made to bring the measurements into the acceptance zone, the procedures described in this document need to be repeated to verify that the results whether or not are satisfactory.” at end of the paragraph.

— A2, : “For a t value of 11, the numerical value of uncertainty is 3,3 times smaller than that for a t value of 1 (this means a t value of 11 leads to 3,3 times better uncertainty than a value of 1)” replaces “A t value of 11 leads to 3,3 times better uncertainty than a value of 1”

— Bibliography: Add four references:

[17] TOUGAARD, A.: Quantitative Analysis of the Inelastic Background in Surface Electron Spectroscopy, *Surface and Interface Analysis*, June 1988, Vol. 11, No. 9, pp. 453-472

[18] ISO 5861, Surface chemical analysis — X-ray photoelectron spectroscopy — Method of intensity calibration for quartz crystal monochromated Al K α XPS instruments

[19] ISO 16129:2018, Surface chemical analysis — X-ray photoelectron spectroscopy — Procedures for assessing the day-to-day performance of an X-ray photoelectron spectrometer

[20] WOLSTENHOLME, J.: Procedure which allows the performance and calibration of an XPS instrument to be checked rapidly and frequently, *Journal of Vacuum Science & Technology A*, June 2020, <https://doi.org/10.1116/6.0000224>