



BSI Standards Publication

**Microbeam analysis — Electron probe
microanalysis — Guidelines for the
determination of experimental parameters
for wavelength dispersive spectroscopy**

National foreword

This British Standard is the UK implementation of ISO 14594:2024. It supersedes BS ISO 14594:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CII/9, Microbeam analysis.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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International
Standard

ISO 14594

**Microbeam analysis — Electron
probe microanalysis — Guidelines
for the determination of
experimental parameters for
wavelength dispersive spectroscopy**

*Analyse par microfaisceaux — Analyse par microsonde
électronique (Microsonde de Castaing) — Lignes directrices
pour la détermination des paramètres expérimentaux pour la
spectrométrie à dispersion de longueur d'onde*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 202, *Microbeam analysis*, Subcommittee SC 2, *Electron probe microanalysis*.

This third edition cancels and replaces the second edition (ISO 14594:2014), which has been technically revised.

The main changes are as follows:

- Introduction has been added;
- Terms in Clause 3 have been updated;
- Technical terms in Clause 5 have been updated and the clause has been restructured;
- Content of the Test report in Clause 7 has been revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

To ensure reliability and reproducibility during electron probe microanalysis (EPMA), the experimental parameters that include beam current, current density, dead time, wavelength resolution, background, analysis area, analysis depth, and analysis volume should be carefully considered. To reliably consider EPMA results, guidelines standardizing the decision procedure of an experimental parameter are important.

Microbeam analysis — Electron probe microanalysis — Guidelines for the determination of experimental parameters for wavelength dispersive spectroscopy

1 Scope

This document gives general guidelines for the determination of experimental parameters relating to the electron probe, the wavelength spectrometer, and the specimen that need to be taken into account when carrying out electron probe microanalysis. It also defines procedures for the determination of probe current, probe diameter, dead time, wavelength resolution, background, analysis area, analysis depth, and analysis volume.

This document is applicable for the analysis of a well-polished specimen using normal beam incidence.

This document does not apply to energy dispersive X-ray spectroscopy.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17025:2017, *General requirements for the competence of testing and testing laboratories*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/>

3.1 analysis area

area, projected by the interaction volume on the beam entrance surface, from which X-rays are emitted (at a defined fraction, e.g. 95 % of the total) and collected by the spectrometer

[SOURCE: ISO 23833:2013, 5.7.1.1]

3.2 analysis depth

maximum depth from which a defined fraction (e.g. 95 % of the total) of the X-rays are emitted from the interaction volume after absorption

[SOURCE: ISO 23833:2013, 5.7.1.2]

3.3 analysis volume

volume from which a defined fraction (e.g. 95 % of the total) of the X-rays are emitted after generation and absorption

[SOURCE: ISO 23833:2013, 5.7.1.3]