
**Microbeam analysis — Analytical
electron microscopy — Selected area
electron diffraction analysis using a
transmission electron microscope**

*Analyse par microfaisceaux — Microscopie électronique analytique
— Analyse par diffraction par sélection d'aire au moyen d'un
microscope électronique en transmission*

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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 documents 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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 202, *Microbeam analysis*, Subcommittee SC 3, *Analytical electron microscopy*.

This second edition cancels and replaces the first edition (ISO 25498:2010), which has been technically revised.

The main changes to the previous edition are as follows:

- the foreword has been revised;
- the introduction has been revised;
- the scope has been revised;
- the figure of Ewald construction has been deleted;
- the terms and definition of terminological entries [3.1](#), [3.2](#), [3.10](#), [3.11](#), [3.12](#), [3.13](#) and [3.14](#) have been added;
- the subclause [4.1](#) has been added;
- [Clause 5](#) has been revised;
- [Clauses 4](#), [6](#), [7](#), and [10](#) and subclauses [8.1.5](#), [8.1.6](#), [8.2.1](#), [8.2.2](#), [8.2.4](#), [8.2.7](#), [8.2.8](#), [8.2.11](#) and [9.1.2](#) have been editorially revised;
- the subclause [9.2.5](#) has been added;
- all formulae have been renumbered;
- [Annex A](#) has been revised;
- the subclause [B.1](#) has been revised;

- the figures have been modified;
- the bibliography has been updated.

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Introduction

Electron diffraction techniques are widely used in transmission electron microscopy (TEM) studies. Applications include phase identification, determination of the crystallographic lattice type and lattice parameters, crystal orientation and the orientation relationship between two phases, phase transformations, habit planes and defects, twins and interfaces, as well as studies of preferred crystal orientations (texture). While several complementary techniques have been developed, for example microdiffraction, convergent beam diffraction and reflected diffraction, the selected area electron diffraction (SAED) technique is the most frequently employed.

This technique allows direct analysis of small areas on thin specimens from a variety of crystalline substances. It is routinely performed on most of TEM in the world. The SAED is also a supplementary technique for acquisition of high resolution images, microdiffraction or convergent beam diffraction studies. The information generated is widely applied in the studies for the development of new materials, improving structure and/or properties of various materials as well as for inspection and quality control purpose.

The basic principle of the SAED method is described in this document. The experimental procedure for the acquirement of SAED patterns, indexing of the diffraction patterns and determination of the diffraction constant are specified. ISO 25498 is intended for use or reference as technical regulation for transmission electron microscopy.

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