



BSI Standards Publication

Optics and photonics — Microlens arrays

Part 4: Test methods for geometrical properties

National foreword

This British Standard is the UK implementation of EN ISO 14880-4:2024. It is identical to ISO 14880-4:2024. It supersedes BS EN ISO 14880-4:2006, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CPW/172, Optics and Photonics.

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

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European foreword

This document (EN ISO 14880-4:2024) has been prepared by Technical Committee ISO/TC 172 "Optics and photonics" in collaboration with Technical Committee CEN/TC 123 "Lasers and photonics" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2025, and conflicting national standards shall be withdrawn at the latest by May 2025.

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

This document supersedes EN ISO 14880-4:2006.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 14880-4:2024 has been approved by CEN as EN ISO 14880-4:2024 without any modification.

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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 172, *Optics and Photonics*, Subcommittee SC 9, *Laser and electro-optical systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 123, *Lasers and photonics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 14880-4:2006), which has been technically revised.

The main changes are as follows:

- Introduction revised;
- Updated the references to terms defined in 14880-1;
- [Figure 8](#) replaced;
- References updated.

A list of all parts in the ISO 14880 series can be found on the ISO website.

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

Examples of applications for microlens arrays include three-dimensional displays, coupling optics associated with arrayed light sources and photo-detectors, enhanced optics for liquid crystal displays, and optical parallel processor elements.

The market in microlens arrays has generated a need for agreement on basic terminology and test methods. Standard terminology and clear definitions are needed not only to promote applications but also to encourage scientists and engineers to exchange ideas and new concepts based on common understanding.

This document contributes to the purpose of the series of ISO 14880 standards, which is to improve the compatibility and interchangeability of lens arrays from different suppliers and to enhance development of the technology using microlens arrays.

Characteristic parameters are defined and examples of applications given in ISO 14880-1. It has been completed by a set of three other International Standards, i.e. ISO 14880-2, ISO 14880-3 and ISO 14880-4.

The measurement of physical characteristics of pitch and surface modulation depth can be made using a stylus instrument and non-contact optical probe system. Physical thickness can be measured with a micrometer. The measurement processes are described in the body of this document.

Optics and photonics — Microlens arrays —

Part 4: Test methods for geometrical properties

1 Scope

This document specifies methods for testing geometrical properties of microlenses in microlens arrays. It is applicable to microlens arrays with very small lenses formed on one or more surfaces of a common substrate and to graded-index microlenses.

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 14880-1, *Optics and photonics — Microlens arrays — Part 1: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14880-1 and the following 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/>

NOTE 1 The symbols adopted for this document are chosen for clarity in this application to microlens arrays but some may not be those commonly used for surface texture measurement.

NOTE 2 The parameters P_x , P_y and h are used in this document to describe geometrical parameters encountered in the measurement of surface texture. P_x , P_y are spacing parameters and are defined as the average value of the length of the mean line section containing a profile peak and adjacent valley. An amplitude parameter, h , is defined as the average difference between peak of the lens profile and the rim. [Figure 1](#) illustrates the geometrical properties of microlens arrays which are to be measured.

3.1

pitch

P_x , P_y

distance between the centres of adjacent lenses which may vary across the array and will vary with direction

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: The pitch is expressed in millimetres.

[SOURCE: ISO 14880-1:2019, 3.4.1.5]

Note 3 to entry: For a stylus instrument this will generally equate to the mean width of the profile elements, R_{sm} , calculated from the roughness profile (see ISO 21920-2:2021, 3.1.14.3).