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Optics and photonics - Microlens arrays - Part 1: Vocabulary (ISO/DIS 14880-1:2017)

Optik und Photonik - Mikrolinsenarrays - Teil 1: Begriffe (ISO/DIS 14880-1:2017)

Optique et photonique - Réseaux de microlentilles - Partie 1: Vocabulaire (ISO/DIS 14880-1:2017)

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Optics and photonics — Microlens arrays —

Part 1: Vocabulary

*Optique et photonique — Réseaux de microlentilles —**Partie 1: Vocabulaire*

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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.

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For an explanation on 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.

The committee responsible for this document is ISO/172 Optics and Photonics, Subcommittee SC 9 Electro-optical systems.

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This second edition cancels and replaces the first edition (ISO 14880-1:2001), which has been technically revised. It also incorporates the Technical Corrigenda ISO 14880-1:2001/Cor 1:2003 and ISO 14880-1:2001/Cor 2:2005.

ISO 14880 consists of the following parts, under the general title *Optics and photonics — Microlens arrays*:

- Part 1: *Vocabulary*
- Part 2: *Test methods for wavefront aberrations*
- Part 3: *Test methods for optical properties other than wavefront aberrations*
- Part 4: *Test methods for geometrical properties*
- Part 5: (Technical Report) *Guidance on testing*

Introduction

The aim of this part of ISO 14880 is to clarify the terms used in the field of microlens arrays.

Microoptics and microlens arrays are found in many modern optical devices.[1] They are used as coupling optics for detector arrays, the digital camera being an example of a mass market application. They are used to enhance the optical performance of liquid crystal displays to couple arrays of light sources and to direct illumination for example in 2D and 3D television, mobile phone and portable computer displays. Microlens arrays are used in wavefront sensors for optical metrology and astronomy, lightfield sensors for three-dimensional photography and microscopy and in optical parallel processor elements.

Multiple arrays of microlenses can be assembled to form optical systems such as optical condensers, controlled diffusers and superlenses.[2][3] Furthermore, arrays of microoptical elements such as micro-prisms and micro-mirrors are used.[4][5]

The expanded market in microlens arrays has generated a need to agree on basic terms and definitions for microlens arrays and systems and this part of ISO 14880 aims to satisfy that need.

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Optics and photonics — Microlens arrays — Part 1: Vocabulary

1 Scope

This part of ISO 14880 defines terms for microlens arrays. It applies to microlens arrays which consist of arrays of very small lenses formed inside or on one or more surfaces of a common substrate and systems. The aim of this part of ISO 14880 is to improve the compatibility and interchangeability of lens arrays from different suppliers and to enhance the development of technology using microlens arrays.

2 Normative references

There are no normative references in this document.

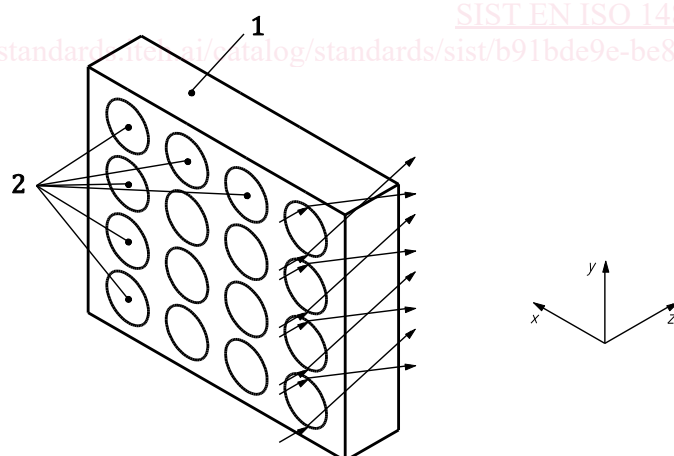
3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE 1 The coordinate system used for the description of the microlenses can be found in figure 1. The description of the coordinate system and its application can be found in clause 4.



Key

- 1 Substrate
- 2 Microlenses

Figure 1 — Microlens array with Cartesian coordinate system

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NOTE 2 Five common types of microlenses are illustrated in figure 5 and described in clause 5.

3.1 Symbols and units of measure

Table 1 lists symbols and units which are used in this part of ISO 14880.

Table 1 — Symbols and units of measure

Symbol	Unit	Term
A_d	mm ²	diffraction-limited optical aperture
A_g	mm ²	geometric aperture
a_1, a_2	mm	lens radius
$2a_1, 2a_2$	mm	lens width
D_n	mm ⁻²	lens density
h	mm	surface modulation depth
L_1, L_2	mm	edge lengths of substrate
NA	none	numerical aperture
NA_d	none	diffraction-limited numerical aperture
NA_g	none	geometric numerical aperture
$n(x, y, z)$	none	refractive index
n_0	none	refractive index at the centre of the lens
P_x, P_y	mm	pitch
$f_{E,b}$	mm	effective back focal length
$f_{E,f}$	mm	effective front focal length
R_c	mm	radius of curvature
S_x, S_y, S_z	mm	coordinates of focal spot position
$\Delta S_x, \Delta S_y, \Delta S_z$	mm	focal spot position shift
T	mm	thickness of substrate
T_c	mm	physical thickness
w_x, w_y	mm	focal spot size
X, Y, Z	mm	coordinates of lens aperture centre position
θ	degree	acceptance angle
Φ_{rms}	parts of wavelength	wavefront aberration
λ	nm	wavelength
v_{eff}	none	effective Abbe-number