



**International
Standard**

ISO 9335

**Optics and photonics — Optical
transfer function — Principles and
procedures of measurement**

*Optique et photonique — Fonction de transfert optique —
Principes et procédures de mesure*

**Third edition
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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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

This third edition cancels and replaces the second edition (ISO 9335:2012), which has been technically revised.

The main changes are as follows:

- text was added concerned with distortion effects in [4.4.6](#);
- a note was added concerned with the notation tangential/sagittal in [7.2](#).
- the document has been revised to be in agreement with the terms and definitions of ISO/IEC Guide 98-3 (GUM) and ISO/IEC Guide 99 (VIM) regarding the expression of measurement uncertainties.”

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

The optical transfer function is an important aid to objective evaluation of the image-forming capability of optical, electro-optical and photographic systems.

In order that optical transfer function measurements achieved using different measuring principles or obtained from measuring instruments in different laboratories can be compared, it is necessary to ensure equivalence of measurement parameters such as focus setting and spatial frequency range. For this reason, an agreed terminology has been defined in order for the measurement parameters used in this document to be understood by all users. This document gives guidance for the construction and operation of equipment for optical transfer function measurement.

The specifications in this document form the basic requirements of measurement instrumentation and procedures for guaranteeing a defined uncertainty of measurement of the optical transfer function.

Optics and photonics — Optical transfer function — Principles and procedures of measurement

1 Scope

This document gives general guidance for the construction and use of equipment for measurement of the optical transfer function (OTF) of imaging systems.

This document specifies important factors that can influence the measurement of the OTF and gives general rules for equipment performance requirements and environmental controls. It specifies important precautions that should be taken to ensure accurate measurements and correction factors to be applied to the collected data.

The OTF measuring equipment described in this document is restricted to that which analyses the radiation distribution in the image plane of the optical imaging system under test. Interferometer-based instruments are outside the scope of this document.

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 9334, *Optics and photonics — Optical transfer function — Definitions and mathematical relationships*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9334 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/ui>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Measuring equipment and environment

4.1 General aspects

4.1.1 Measuring conditions

Any measured OTF depends on the imaging state (I-state) of the imaging system. Thus, before making measurements, those parameters which form the I-state of the system shall be identified and the degree to which the I-state depends on those parameters determined. The complete set of parameters that form the I-state shall be set to fixed values. The fixed values represent a particular I-state and are called the measuring conditions.

4.1.2 Uncertainty of measurement

The measuring equipment and the environment in which it is used, shall allow the prescribed measuring conditions to be set and maintained to a precision which is consistent with the required uncertainty