

INTERNATIONAL STANDARD

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Optics and optical instruments — Optical transfer function — Principles and procedures of measurement

*Optique et instruments d'optique — Fonction de transfert optique —
Principes et procédures de mesure*



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Contents

	Page
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Measuring equipment and environment	1
5 Measurement procedures	9
6 Corrections to measured data	12
7 Presentation of OTF data	13
8 Accuracy checks	14

Annex

A Examples of the presentation of OTF data	15
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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9335 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 1, *Fundamental standards*.

Annex A of this International Standard is for information only.

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Introduction

The optical transfer function is an important aid to objective evaluation of the image forming capability of optical, electrooptical 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 that the measurement parameters called upon in this International Standard can be understood by all users. This International Standard gives guidance for the construction and operation of equipment for optical transfer function measurement.

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

Optics and optical instruments — Optical transfer function — Principles and procedures of measurement

1 Scope

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

This International Standard 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 specifies correction factors to be applied to the collected data.

The optical transfer function measuring equipment described in this International Standard is restricted to that which analyses the radiation distribution in the image plane of the optical imaging system under test. It does not include interferometer-based instruments.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9334:1995, *Optics and optical instruments — Optical transfer function — Definitions and mathematical relationships*.

ISO 9336-1:1994, *Optics and optical instruments — Optical transfer function — Application — Part 1: Interchangeable lenses for 35 mm still cameras*.

ISO 9336-2:1994, *Optics and optical instruments — Optical transfer function — Application — Part 2: Lenses for office copiers*.

ISO 9336-3:1994, *Optics and optical instruments — Optical transfer function — Application — Part 3: Telescopes*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 9334 apply.

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 Accuracy 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 accuracy of measurement. The accuracy of an OTF measurement may be considered as the combination of measurement uncertainties arising from the many separate