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# Optics and ~~Photonics~~ photonics — Uncertainty of optical transfer function (OTF) measurement

*Optique et photonique — Incertitude de mesurage de la fonction de transfert optique (OTF)*

FDIS stage

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: + 41 22 749 01 11
~~Email~~E-mail: copyright@iso.org
Website: www.iso.org

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## Foreword

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

This second edition cancels and replaces the first edition (ISO 11421:1997), which has been technically revised.

The main changes are as follows:

— ~~—~~sagittal and tangential OTF were defined;

— ~~—~~symbols, formulae and nomenclature have been revised

— ~~—~~off-axis magnification errors due to image distortion using grating objects has been newly added;

— ~~—~~the document has been revised to be in agreement with the terms and definitions of ISO/IEC Guide 98 (GUM) and ISO/IEC Guide 99 (VIM) regarding the expression of measurement uncertainties;

— ~~—~~Explanations for the calculation of measurement uncertainties have been added;

— Annex C~~—Annex C~~ was revised.

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 (OTF) is one of the main criteria used for objectively evaluating the image-forming capability of optical, electro-optical and photographic systems.

The terms used in the measurement of OTF are defined in ISO 9334, whilst ISO 9335 covers the actual principles and procedures of measurement. A further International Standard, ISO 9336 (all parts), deals with specific applications in various optical and electro-optical fields and is in several parts, each dealing with a particular application.

Although ISO 9335 lists the main factors which influence the uncertainty of OTF measurement and describes procedures which are aimed at achieving accurate and repeatable results, it does not cover in detail the techniques and procedures for evaluating the uncertainty of OTF measuring equipment and for estimating the uncertainty in measurements made on specific imaging systems.

The present document lists the main sources of uncertainty in OTF measuring equipment and provides guidance on how these can be assessed and how the results of these assessments can be used in estimating the uncertainty in any measurement of OTF. One of the aims in preparing this document is to encourage the setting of more realistic uncertainty levels for the results of OTF measurements. Another is to encourage the use of methods of expressing the uncertainty of OTF test equipment which recognize the fact that the uncertainty of a particular measurement is a function of both the equipment and the test piece.