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First edition
2007-07-15

Optics and photonics — Interferometric measurement of optical elements and optical systems —

Part 4: Interpretation and evaluation of tolerances specified in ISO 10110

Optique et photonique — Mesurage interférométrique de composants et de systèmes optiques —

Partie 4: Directives pour l'évaluation des tolérances spécifiées dans l'ISO 10110



Reference number
ISO 14999-4:2007(E)

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Published in Switzerland

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Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
3.1 Mathematical definitions.....	1
3.2 Definition of optical functions	2
3.3 Definition of values related to the optical functions defined in 3.2.....	3
4 Relating interferometric measurements to surface form deviation or transmitted wavefront deformation	6
4.1 Test areas	6
4.2 Quantities	6
4.3 Single-pass transmitted wavefront.....	6
4.4 Double-pass transmitted wavefront.....	6
4.5 Surface form deviation	6
4.6 Conversion to other wavelengths	6
Annex A (normative) Visual interferogram analysis.....	7
Bibliography	15

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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

ISO 14999-4 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

ISO 14999 consists of the following parts, under the general title *Optics and photonics — Interferometric measurement of optical elements and optical systems*:

- *Part 1: Terms, definitions and fundamental relationships*
- *Part 2: Measurement and evaluation techniques*
- *Part 3: Calibration and validation of interferometric test equipment and measurements*
- *Part 4: Interpretation and evaluation of tolerances specified in ISO 10110*

Parts 1, 2 and 3 are Technical Reports.

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Introduction

This part of ISO 14999 provides a theoretical frame upon which are based indications from ISO 10110-5 and/or ISO 10110-14.

ISO 10110-5 refers to deformations in the form of an optical surface, and provides a means for specifying tolerances for certain types of surface deformations in terms of "fringe spacings".

ISO 10110-14 refers to deformations of a wavefront transmitted once through an optical system, and provides a means of specifying similar deformation types in terms of optical "wavelengths".

Because it is common practice to measure the surface form deviation interferometrically as the wavefront deformation caused by a single reflection from the optical surface at normal (90° to surface) incidence, it is possible to describe a single definition of interferometric data reduction that can be used in both cases. One "fringe spacing" (as defined in ISO 10110-5) is equal to a surface deformation that causes a deformation of the reflected wavefront of one wavelength.

Certain scaling factors apply depending on the type of interferometric arrangement – for example, whether the test object is being measured in single pass or double pass.

Because of the potential for confusion and mis-interpretation, units of nanometres rather than units of "fringe spacings" or "wavelengths" should be used for the value of surface form deviation or the value of wavefront deformation, where possible. Where "fringe spacings" or "wavelengths" are used as units, the wavelength should also be specified.