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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 General discussion of surface imperfection specification and measurement systems **1**
5 Dimensional system of surface imperfection specifications **2**
5.1 General 2
5.2 Origin of the dimensional system 2
5.3 Dimensional comparison standard 2
6 Visibility system of surface imperfection specifications **2**
6.1 General 2
6.2 Origin of the visibility system 3
6.3 Brightness comparison standard 3
7 Comparison of visibility and dimensional specifications **3**
Bibliography **5**

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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 documents 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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

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

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Introduction

ISO 10110-7 provides a notation for the indication of the level of acceptability of surface imperfections of optical elements and optical assemblies. It provides two systems of drawing notations for permissible imperfections: one based on area and size of imperfections and the other based on the visibility or appearance of imperfections.

ISO 14997 provides test methods for these two systems of drawing notation.

These two systems of specification and verification are totally different, with different accumulation and acceptance rules. As a result, a user who is only familiar with one of the systems can become confused when needing to interpret specifications in the other system. There is no way to translate a specification in one system into a specification in the other system because their criteria for acceptability are not interchangeable. The size or area of an imperfection is not correlated with its visibility or brightness.

It is, however, possible to provide a specification in each system which results in practically the same yield loss for large numbers of optical components.

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Optics and photonics — Preparation of drawings for optical elements and systems — Surface imperfection specification and measurement systems

1 Scope

This document intends to guide the user to understand the origins, meanings and differences between the two systems of specifying and evaluating surface imperfections in ISO 10110-7 and ISO 14997, specifically the dimensional method and the visibility method, and to provide information on how to use them. Tables are provided to show specifications of roughly equivalent yield loss for imperfections in the two systems.

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 10110-7, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 7: Surface imperfections*

ISO 14997, *Optics and photonics — Test methods for surface imperfections of optical elements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10110-7 and ISO 14997 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

4 General discussion of surface imperfection specification and measurement systems

ISO 10110-7 specifies the indication of the level of acceptability of surface imperfections within the test region of individual optical elements and optical assemblies. These include localized surface imperfections, edge chips and long scratches. It provides two systems of drawing notations for permissible imperfections: one based on area and size of imperfections, referred to as the dimensional method, and the other based on the visibility or appearance of imperfections, referred to as the visibility method.

ISO 14997 provides test methods for these two systems of drawing notation. For imperfections specified using the dimensional method, three test methods are described. The first is visual evaluation of the surface without any comparison standard (IV_D). The second is a dimensional assessment of a surface imperfection when compared with a dimensional comparison standard comprised of a series of artefacts of known size (IS_D). The third is the dimensional measurement of a surface imperfection using magnification and either a dimensional comparison standard or a reticle or ruler (IM_D).

For imperfections specified using the visibility method, two inspection methods are described. The first is visual evaluation of the surface without any comparison standard (IV_V). The second is a visibility assessment of a surface imperfection when compared with a brightness comparison standard comprised of a series of artefacts of known brightness (IS_V).

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