INTERNATIONAL STANDARD

ISO 10110-7

Third edition
2017-08

Optics and photonics — Preparation of drawings for optical elements and systems —

Part 7: Surface imperfections

Optique et photonique — Indications sur les dessins pour éléments et systèmes optiques —

Partie 7: Imperfections de surface

Reference number
ISO 10110-7:2017(E)

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This third edition cancels and replaces the second edition (ISO 10110-7:2008), which has been technically revised.

The main changes compared to the previous edition are as follows:

— an additional notation has been added which allows the specification of a maximum allowable width for imperfections;

— long imperfection accumulation rules have been corrected to coincide with the Renard series of grades;

— the rules for determining concentrations have been clarified;

— the test method notations and meanings have been clarified;

— an additional notation has been added which allows the use of the popular scratch and dig specification for cosmetic surface imperfections;

— in addition, several changes have been made to bring this document into alignment with the inspection methods for surface imperfections which are described in ISO 14997, and various editorial corrections have been made throughout this document.

A list of all parts in the ISO 10110 series can be found on the ISO website.

Introduction

A localized surface imperfection, such as a dig or a scratch resulting from handling or manufacture, can degrade the perceived quality of an optical component. In some cases, surface imperfections are specified according to their visibility, and in other cases, according to their size.

Visual dark field inspection reveals the location of very small imperfections. The use of a brightness comparison standard, together with tolerance levels agreed upon by the manufacturer and user, permits classification of an imperfection as acceptable or unacceptable. This form of subjective inspection based on visibility or a visual assessment of brightness or apparent size, although economical and fast, lacks precision.

In cases where the size, and not the brightness, is important, surface imperfections are specified according to their affected area (dimensional assessment). In this case, visual assessment using a dimensional comparison standard is still possible, but lacks the precision required for some applications. Measurement is only required as a second stage operation following a visual inspection to determine location and to select a surface imperfection worthy of study. In such cases, a drawing notation indicating this level of inspection is required and can be added to the specification.

Optics and photonics — Preparation of drawings for optical elements and systems —

Part 7: Surface imperfections

1 Scope

ISO 10110 (all parts) specifies the presentation of design and functional requirements for single optical elements and for optical assemblies in technical drawings used for their manufacture and inspection.

This document specifies the indication of the level of acceptability of surface imperfections within a test region on individual optical elements and optical assemblies. These include localized surface imperfections, edge chips and long scratches.

The acceptance level for imperfections is specified, taking into account functional effects (affecting image formation or durability of the optical element), as well as cosmetic (appearance) effects.

This document applies to transmitting and reflecting surfaces of finished optical elements, whether or not they are coated, and to optical assemblies. It allows permissible imperfections to be specified according to the area affected by imperfections, or alternatively by the visibility of imperfections, on components or in optical assemblies.

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 10110-1, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 1: General*

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 10110-1 and the following 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

NOTE See also Figure 1 for an illustration of the classification of imperfections.