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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 13696

July 2002

ICS 37.020

English version

Optics and optical instruments - Test methods for radiation scattered by optical components (ISO 13696:2002)

Optique et instruments d'optique - Méthodes d'essai du rayonnement diffusé par les composants optiques (ISO 13696:2002)

Optik und optische Instrumente - Bestimmung von Streustrahlung hervorgerufen durch optische Komponenten (ISO 13696:2002)

This European Standard was approved by CEN on 8 June 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 13696:2002 (E)

CORRECTED 2002-09-25

Foreword

This document (ISO 13696:2002) has been prepared by Technical Committee ISO/TC 172 "Optics and optical instruments" in collaboration with Technical Committee CEN/TC 123 "Lasers and laser-related equipment", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2003, and conflicting national standards shall be withdrawn at the latest by January 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of ISO 13696:2002 has been approved by CEN as EN ISO 13696:2002 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

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Annex ZA (normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 12005	1999	Lasers and laser-related equipment - Test methods for laser beam parameters - Polarization	EN ISO 12005	1999
ISO 14644-1	1999	Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness	EN ISO 14644-1	1999

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INTERNATIONAL STANDARD

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2002-07-15

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2004-08-01

Optics and optical instruments — Test methods for radiation scattered by optical components

*Optique et instruments d'optique — Méthodes d'essai du rayonnement
diffusé par les composants optiques*

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ISO 13696:2002(E)

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13696 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems*.

Annexes A to D of this International Standard are for information only.

In this corrected version of ISO 13696:2002, the following changes have been incorporated:

page 10, equation (5) reads $S_{\text{for}} = \frac{1}{N} \sum_{i=1}^N \frac{V_{\text{s,for}}(r_i) - (\tau_s V_u)}{V_c(r_i) - V_u}$

equation (6) reads $S_{\text{bac}} = \frac{1}{N} \sum_{i=1}^N \frac{V_{\text{s,bac}}(r_i) - (1 + \rho_s) V_u}{V_c(r_i) - V_u}$

equation (7) reads $S_{\text{for}}(r_i) = \frac{V_{\text{s,for}}(r_i) - (\tau_s V_u)}{V_c - V_u}$

page 11, equation (8) reads $S_{\text{bac}}(r_i) = \frac{V_{\text{s,bac}}(r_i) - (1 + \rho_s) V_u}{V_c - V_u}$

page 19, equation (C2) reads $\sigma_s = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (M_s - S_{\text{bac,sc}}(r_i))^2}$

page 26, the year of publication of ISO 12005 has been inserted.

Introduction

In most applications, scattering in optical components reduces the efficiency and deteriorates the image-forming quality of optical systems. Scattering is predominantly produced by imperfections of the coatings and the optical surfaces of the components. Common surface features which contribute to optical scattering are imperfections of substrates, thin films and interfaces, surface and interface roughness, or contamination and scratches. These imperfections deflect a fraction of the incident radiation from the specular path. The spatial distribution of this scattered radiation is dependent on the wavelength of the incident radiation and on the individual optical properties of the component. For most applications in laser technology and optics, the amount of total loss produced by scattering is a useful quality criterion of an optical component.

This International Standard describes a testing procedure for the corresponding quantity, the total scattering (TS) value, which is defined by the measured values of backward scattering and forward scattering. The measurement principle described in this International Standard is based on an Ulbricht sphere as the integrating element for scattered radiation. An alternative apparatus with a Coblentz hemisphere, which is also frequently employed for collecting scattered light, is described in annex A. Currently, advanced studies on the comparability and the limitations of both light collecting elements are being performed (e.g. round robin tests, EUREKA-project EUROLASER: CHOCLAB).

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