INTERNATIONAL STANDARD ISO 14997

This is a preview of "ISO 14997:2011". Click here to purchase the full version from the ANSI store.

Second edition
2011-04-15

Optics and photonics — Test methods for surface imperfections of optical elements

Optique et photonique — Méthodes d'essai applicables aux imperfections de surface des éléments optiques

Reference number
ISO 14997:2011(E)

© ISO 2011

This is a preview of "ISO 14997:2011". Click here to purchase the full version from the ANSI store.

COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

 © ISO 2011 – All rights reserved

This is a preview of "ISO 14997:2011". Click here to purchase the full version from the ANSI store.

Contents

Page

Foreword ... iv
Introduction ... v
1 Scope ... 1
2 Normative references ... 1
3 Terms and definitions ... 1
4 Physical principles ... 2
5 Measurement of obscured or affected area ... 2
5.1 General ... 2
5.2 Requirements ... 4
5.3 Calibration ... 4
5.4 Procedure ... 4
5.5 Test report ... 4
Annex A (informative) **Component inspection** ... 6
Annex B (informative) **Recommended dimensions of artefacts on a scale comparison plate** ... 7
Annex C (informative) **Description of the instrument used for measuring imperfections below 0,01 mm: microscope image comparator** ... 8
Annex D (informative) **Imperfection quality control** ... 11
Annex E (normative) **Preferred values of grade numbers and subdivision factors** ... 13
Bibliography ... 14

© ISO 2011 – All rights reserved

This is a preview of "ISO 14997:2011". Click here to purchase the full version from the ANSI store.

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 14997 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

This second edition cancels and replaces the first edition (ISO 14997:2003), which has undergone minor revision to adapt ISO 14997:2011 to ISO 10110-7:2008; the main changes are the deletion of one of the two test methods and the addition of a new Annex E.

 © ISO 2011 – All rights reserved

This is a preview of "ISO 14997:2011". Click here to purchase the full version from the ANSI store.

Introduction

This International Standard was developed in response to worldwide demand for test methods for surface imperfections that are objective and permit fast assessment of component quality. Existing standards have been assessed (see Reference [9]) and found to be too variable in use to satisfy the current requirements of industry. Surface imperfections, such as digs and scratches, arise from localized damage during or after manufacture. They can be visible as a result of the light they scatter, giving rise to a false impression of poor quality. Alternatively, this light can appear as unwanted veiling glare (stray radiation) in an image plane, or it can lead to a degradation in signal quality at an image sensor. Imperfections can also provide centres of stress, eventually leading to failure of components exposed to high laser radiation power/energy densities.

Since modern methods of surface examination are capable of atomic resolution, no surface is likely to be found totally free of localized imperfections. Most surfaces produced are satisfactory for their intended purpose, but a small proportion can have suffered obvious damage and will be reworked or regarded as unacceptable. This can leave some components which, although slightly damaged, may still be found acceptable, when tested, depending on the level of acceptability of surface imperfections requested by the customer and specified on drawings in ISO 10110-7. This International Standard describes how these methods are implemented.

The obscuration of imperfections larger than 10 µm can be judged visually by comparison of areas with artefacts of known size on a comparison plate. The obscuration caused by imperfections equal to or less than 10 µm across and yet still visible under dark-field illumination either is too small for accurate area measurement or may transmit as well as scatter radiation. These need to be quantified by comparison of their radiometric obscuration with totally absorbing artefacts of known size. Every imperfection detected is measured and considered for summation to produce a level of grade for each surface.

It should be noted that other light scattering defects, which also need to be measured, can arise as digs distributed over the surface of an incompletely polished surface, and as bubbles and as striae within an optical material. The measurement of laser damage thresholds also requires sensitive means for quantifying the level of radiation scattered by damage in its early stages.

© ISO 2011 – All rights reserved