

SLOVENSKI STANDARD
SIST EN ISO 11254-3:2006

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Lasers and laser-related equipment - Determination of laser-induced damage threshold of optical surfaces - Part 3: Assurance of laser power (energy) handling capabilities (ISO 11254-3:2006)

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Laser und Laseranlagen - Bestimmung der laserinduzierten Zerstörschwelle optischer Oberflächen - Teil 3: Zertifizierung der Belastbarkeit hinsichtlich Laserleistung(-energie) (ISO 11254-3:2006)

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Lasers et équipements associés aux lasers - Détermination du seuil d'endommagement provoqué par laser sur les surfaces optiques - Partie 3: Vérification de la capacité a supporter la puissance (l'énergie) laser (ISO 11254-3:2006)

Ta slovenski standard je istoveten z: EN ISO 11254-3:2006

ICS:

31.260	Optoelektronika, laserska oprema	Optoelectronics. Laser equipment
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ICS 31.260

English Version

Lasers and laser-related equipment - Determination of laser-induced damage threshold of optical surfaces - Part 3:
Assurance of laser power (energy) handling capabilities (ISO 11254-3:2006)

Lasers et équipements associés aux lasers - Détermination du seuil d'endommagement provoqué par laser sur les surfaces optiques - Partie 3: Vérification de la capacité à supporter la puissance (l'énergie) laser (ISO 11254-3:2006)

Laser und Laseranlagen - Bestimmung der laserinduzierten Zerstörschwelle optischer Oberflächen - Teil 3: Zertifizierung der Belastbarkeit hinsichtlich Laserleistung(-energie) (ISO 11254-3:2006)

This European Standard was approved by CEN on 19 August 2006.

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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 Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN ISO 11254-3:2006) has been prepared by Technical Committee ISO/TC 172 "Optics and optical instruments" in collaboration with Technical Committee CEN/TC 123 "Lasers and photonics", 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 March 2007, and conflicting national standards shall be withdrawn at the latest by March 2007.

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

Endorsement notice

The text of ISO 11254-3:2006 has been approved by CEN as EN ISO 11254-3:2006 without any modifications.

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**Lasers and laser-related equipment —
Determination of laser-induced damage
threshold of optical surfaces —**

Part 3:

**Assurance of laser power (energy)
handling capabilities**

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*Lasers et équipements associés aux lasers — Détermination du seuil
d'endommagement provoqué par laser sur les surfaces optiques —*

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*Partie 3: Vérification de la capacité à supporter la puissance (l'énergie)
laser*

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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.

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 11254-3 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems*.

ISO 11254 consists of the following parts, under the general title *Lasers and laser-related equipment — Determination of laser-induced damage threshold of optical surfaces*:

— Part 1: 1-on-1 test

— Part 2: S-on-1 test

— Part 3: Assurance of laser power (energy) handling capabilities

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Introduction

Optical components can be damaged by laser irradiation of sufficiently high energy or power density. At any specified laser irradiation level the probability of laser damage is usually higher for the surface of a component than for its bulk. Thus the limiting value of an optical component is usually given by the damage threshold of its surface.

This document provides a test procedure for obtaining consistent measurement results, which may be used for acceptance tests or may be compared between different testing laboratories.

This testing procedure is applicable to all combinations of different laser wavelength and pulse length durations. Comparison of laser damage threshold data may be misleading unless the measurements have been taken at identical wavelengths and pulse lengths.

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Lasers and laser-related equipment — Determination of laser-induced damage threshold of optical surfaces —

Part 3: Assurance of laser power (energy) handling capabilities

SAFETY PRECAUTIONS — Some laser and optical components are made of materials which are toxic if vaporized (e.g. ZnSe, GaAs, CdTe, ThF₄, chalcogenides, Be, Cr, Ni). Due care shall be taken not to damage these materials without taking suitable safety precautions.

1 Scope

This part of ISO 11254 describes a test procedure for assurance of power density (energy density) handling capability of optical surfaces, both coated and uncoated.

This part of ISO 11254 specifies this procedure by providing two test methods for assurance of the power density (energy density) handling capability of optical surfaces.

The first method provides a rigorous test that fulfils requirements at a specified confidence level in the knowledge of potential defects. (standards.iteh.ai)

The second method provides a simple test for an empirically derived test level, allowing an inexpensive test.

2 Normative references

The following referenced documents are indispensable for the application 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 10110-7:1996, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 7: Surface imperfection tolerances*

ISO 11145, *Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11145 and the following apply.

3.1 surface damage

any permanent laser radiation-induced change of the surface characteristics of the specimen, which can be observed by an inspection technique described in this part of ISO 11254

3.2 1-on-1 test

test programme that uses one shot of laser radiation on each unexposed site on the specimen surface

3.3 S-on-1 test

test programme that uses S shots on each unexposed site on the specimen surface

3.4 target plane

plane tangential to the surface of the specimen at the point of intersection of the test laser beam propagation axis with the surface of the specimen

3.5 effective pulse duration

τ_{eff}
ratio of total pulse energy to peak pulse power

3.6 assurance level

ϕ
energy density/power density/linear power density of the laser radiation incident on the optical surface at which the component is tested

3.7 assurance area

A_{ϕ}
area over which the value of the energy density $H(x,y,z)$ is equal to or greater than the assurance level, ϕ

3.8 confidence level

γ
complement of the probability of successful completion of the assurance test

3.9 effective beam diameter

twice the square root of the assurance spot area divided by pi (π)

See Table 1 for symbols and units.

$$d_{\phi, \text{eff}} = 2 \sqrt{\frac{P}{\pi E_{\text{max}}}} \quad (1)$$

3.10 flat-top beam

beam that has a broad area of nearly constant peak intensity (or fluence)