Optika ja optilised mõõteriistad. Laser ja laseriga seonduvad seadmed. Katsemeetodid laserikiire võimsuse, energia ja ajutiste parameetrite määramiseks

Optics and photonics - Lasers and laser-related equipment - Test methods for laser beam power, energy and temporal characteristics

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 11554:2008 sisaldab Euroopa standardi EN ISO 11554:2008 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 11554:2008 consists of the English text of the European standard EN ISO 11554:2008.
Standard on kinnitatud Eesti Standardikeskuse 18.08.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 18.08.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 16.07.2008.	Date of Availability of the European standard text 16.07.2008.
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

ICS 31.260

Võtmesõnad: karakteristikud, katsed, laserid, laserikiired, lasertehnoloogia abil valmistatud tooted, määramine, optika, optikaseadmed

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11554

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Supersedes EN ISO 11554:2006

English Version

Optics and photonics - Lasers and laser-related equipment - Test methods for laser beam power, energy and temporal characteristics (ISO 11554:2006)

Optique et photonique - Lasers et équipements associés aux lasers - Méthodes d'essai de la puissance et de l'énergie des faisceaux lasers et de leurs caractéristiques temporelles (ISO 11554:2006)

Optik und Photonik - Laser und Laseranlagen - Prüfverfahren für Leistung, Energie und Kenngrößen des Zeitverhaltens von Laserstrahlen (ISO 11554:2006)

This European Standard was approved by CEN on 22 June 2008.

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 CEN 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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.

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

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Ref. No. EN ISO 11554:2008: E

Foreword

The text of ISO 11554:2006 has been prepared by Technical Committee ISO/TC 172 “Optics and optical instruments” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11554:2008 by 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 January 2009, and conflicting national standards shall be withdrawn at the latest by January 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 11554:2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directives, see informative Annexes ZA and ZB, which are integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

Endorsement notice

The text of ISO 11554:2006 has been approved by CEN as a EN ISO 11554:2008 without any modification.

Annex ZA
((informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive for machinery 98/37/EC amended by Directive 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements 1.5.10 Radiation and 1.5.12 Laser equipment of that Directive and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this International standard.

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements 1.5.10 *Radiation* and 1.5.12 *Laser radiation* of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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Introduction

The measurement of laser power (energy for pulsed lasers) is a common type of measurement performed by laser manufacturers and users. Power (energy) measurements are needed for laser safety classification, stability specifications, maximum laser output specifications, damage avoidance, specific application requirements, etc. This document provides guidance on performing laser power (energy) measurements as applied to stability characterization. The stability criteria are described for various temporal regions (e.g., short-term, medium-term and long-term) and provide methods to quantify these specifications. This International Standard also covers pulse measurements where detector response speed can be critically important when analysing pulse shape or peak power of short pulses. To standardize reporting of power (energy) measurement results, a report template is also included.

This International Standard is a Type B standard as stated in ISO 12100-1.

The provisions of this International standard may be supplemented or modified by a Type C standard.

Note that for machines which are covered by the scope of a Type C standard and which have been designed and built according to the provisions of that standard, the provisions of that Type C standard take precedence over the provisions of this Type B standard.

Optics and photonics — Lasers and laser-related equipment — Test methods for laser beam power, energy and temporal characteristics

1 Scope

This International Standard specifies test methods for determining the power and energy of continuous-wave and pulsed laser beams, as well as their temporal characteristics of pulse shape, pulse duration and pulse repetition rate. Test and evaluation methods are also given for the power stability of cw-lasers, energy stability of pulsed lasers and pulse duration stability.

The test methods given in this International Standard are used for the testing and characterization of lasers.

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 last edition of the referenced document (including any amendments) applies.

ISO 11145:2006, *Optics and optical instruments — Lasers and laser-related equipment — Vocabulary and symbols*

IEC 61040:1990, *Power and energy measuring detectors, instruments and equipment for laser radiation*

International vocabulary of basic and general terms in metrology (VIM). BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 2nd ed. 1993

3 Terms and definitions

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

3.1
relative intensity noise
RIN
$R(f)$
single-sided spectral density of the power fluctuations normalized to the square of the average power as a function of the frequency f

NOTE 1 The relative intensity noise $R(f)$ or RIN as defined above is explicitly spoken of as the “relative intensity noise spectral density”, but usually simply referred to as RIN.

NOTE 2 For further details, see Annex A.

3.2
small signal cut-off frequency
f_c
frequency at which the laser power output modulation drops to half the value obtained at low frequencies when applying small, constant input power modulation and increasing the frequency