BS EN ISO 11554:2017
Incorporating corrigendum March 2020

BSI Standards Publication

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

Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

National foreword

This British Standard is the UK implementation of EN ISO 11554:2017. It is identical to ISO 11554:2017. It supersedes BS EN ISO 11554:2008, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CPW/172, Optics and Photonics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 13456 8

ICS 31.260

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2017.

Amendments/corrigenda issued since publication

Date	Text affected
31 March 2020	Annex ZA added

Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11554

September 2017

ICS 31.260

Supersedes EN ISO 11554:2008

English Version

Optics and photonics - Lasers and laser-related equipment - Test methods for laser beam power, energy and temporal characteristics (ISO 11554:2017)

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 11554:2017)

Optik und Photonik - Laser und Laseranlagen - Prüfverfahren für Leistung, Energie und Kenngrößen des Zeitverhaltens von Laserstrahlen (ISO 11554:2017)

This European Standard was approved by CEN on 5 September 2017.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2017 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO 11554:2017 E

Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

Contents Page

European Foreword 3

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC aimed to be covered 4

Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

European Foreword

This document (EN ISO 11554:2017) has been prepared by Technical Committee ISO/TC 172 "Optics and photonics" 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 2018 and conflicting national standards shall be withdrawn at the latest by March 2018.

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

This document supersedes EN ISO 11554:2008.

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 EU Directive(s).

For relationship with EU Directive, see informative Annex ZA, which is an 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 11554:2017 has been approved by CEN as EN ISO 11554:2017 without any modification.

Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

ANNEX ZA
(informative)
Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/396 Mandate to CEN and CENELEC for standardisation in the field of machinery to provide one voluntary means of conforming to essential requirements of EU Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table Z.A.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that EU Directive 2006/42/EC, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and EU Directive 2006/42/EC

Essential Requirements of EU Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.5.10 radiation	Entire standard	
1.5.12 laser radiation	Entire standard	

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

AVA Documents
Document Sharing Hub

Full document details: BS EN ISO 11554:2017

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Symbols and units of measurement ... **2**
5 Measurement principles ... **3**
6 Measurement configuration, test equipment and auxiliary devices ... **3**
6.1 Preparation ... 3
6.1.1 Sources with small divergence angles ... 3
6.1.2 Sources with large divergence angles ... 3
6.1.3 RIN measurement ... 4
6.1.4 Measurement of small signal cut off frequency ... 5
6.2 Control of environmental impacts ... 5
6.3 Detectors ... 6
6.4 Beam-forming optics ... 7
6.5 Optical attenuators ... 7
7 Measurements ... **7**
7.1 General ... 7
7.2 Power of cw lasers ... 7
7.3 Power stability of cw lasers ... 8
7.4 Pulse energy of pulsed lasers ... 8
7.5 Energy stability of pulsed lasers ... 8
7.6 Temporal pulse shape, pulse duration, rise time, fall time and peak power ... 8
7.7 Pulse duration stability ... 8
7.8 Pulse repetition rate ... 8
7.9 Relative intensity noise, RIN ... 9
7.10 Small signal cut-off frequency ... 9
8 Evaluation ... **9**
8.1 General ... 9
8.2 Power of cw lasers ... 10
8.3 Power stability of cw lasers ... 10
8.4 Pulse energy of pulsed lasers ... 10
8.5 Energy stability of pulsed lasers ... 10
8.6 Temporal pulse shape, pulse duration, rise time, fall time and peak power ... 11
8.7 Pulse duration stability ... 12
8.8 Pulse repetition rate ... 13
8.9 Relative intensity noise, RIN ... 13
8.10 Small signal cut-off frequency ... 13
9 Test report ... **13**
Annex A (informative) **Relative intensity noise (RIN)** ... **16**
Bibliography ... **18**

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS EN ISO 11554:2017

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 9, *Electro-optical systems*.

This fourth edition cancels and replaces the third edition (ISO 11554:2006) which has been technically revised. The following changes were made:

a) Subclause 3.1: definition of RIN was changed in order to harmonize with ISO 11145:2016.

b) Clause 4, note 3: Expression for dB calculation was corrected.

c) Figure 3: Explanation of M was modified.

d) Subclause 7.9: Measurement of RIN was added, and former content of 7.9 was moved to 7.10.

e) Subclause 7.10: Explanation for the measurement of small signal cut-off frequency was modified.

f) Subclause 8.9: Explanation for RIN was added and former content of 8.9 was moved to 8.10.

g) Clause 9, item 8): Parameters for RIN were added, and former content of item 8) was moved to item 9).

h) Equation numbers were renumbered.

© ISO 2017 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS EN ISO 11554:2017

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 document 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 document is a Type B standard as stated in ISO 12100.

The provisions of this document 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.

© ISO 2017 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS EN ISO 11554:2017