SLOVENSKI STANDARD
SIST EN ISO 11145:2019

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Nadomešča:
SIST EN ISO 11145:2016

Optika in fotonska tehnologija - Laserji in z laserji povezana oprema - Slovar in simboli (ISO 11145:2018)

Optics and photonics - Lasers and laser-related equipment - Vocabulary and symbols (ISO 11145:2018)

Optik und Photonik - Laser und Laseranlagen - Begriffe und Formelzeichen (ISO 11145:2018)

Optique et photonique - Lasers et équipements associés aux lasers - Vocabulaire et symboles (ISO 11145:2018)

Ta slovenski standard je istoveten z: **EN ISO 11145:2018**

ICS:

01.040.31	Elektronika (Slovarji)	Electronics (Vocabularies)
01.080.40	Grafični simboli za uporabo v risbah, diagramih, načrtih v elektrotehniki in elektroniki ter v ustrezni tehnični proizvodni dokumentaciji	Graphical symbols for use on electrical and electronics engineering drawings, diagrams, charts and in relevant technical product documentation
31.260	Optoelektronika, laserska oprema	Optoelectronics. Laser equipment

SIST EN ISO 11145:2019 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11145

December 2018

ICS 01.040.31; 01.080.40; 31.260

Supersedes EN ISO 11145:2016

English Version

Optics and photonics - Lasers and laser-related equipment - Vocabulary and symbols (ISO 11145:2018)

Optique et photonique - Lasers et équipements associés aux lasers - Vocabulaire et symboles (ISO 11145:2018)

Optik und Photonik - Laser und Laseranlagen - Begriffe und Formelzeichen (ISO 11145:2018)

This European Standard was approved by CEN on 23 September 2018.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN ISO 11145:2018 E

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European foreword

This document (EN ISO 11145:2018) 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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 11145:2016.

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 the relationship with EU Directive(s) 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 11145:2018 has been approved by CEN as EN ISO 11145:2018 without any modification.

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/396 (Machinery) "Mandate to CEN and Cenelec for standardisation in the field of machinery" to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

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 ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

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

Essential Requirements of Directive 2006/42/EC	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
1.5.10	3	
1.5.12	3	

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.

INTERNATIONAL STANDARD

ISO 11145

Fifth edition
2018-11

Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols

Optique et photonique — Lasers et équipements associés aux lasers — Vocabulaire et symboles

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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.

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 of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Laser and electro-optical systems*.

This fifth edition cancels and replaces the fourth edition ISO 11145:2016, which has been technically revised. The main changes compared to the previous edition are as follows:

a) the term beam position has been renamed “beam centroid” and defined formally as a first-order moment;

b) the term beam ellipticity has been clarified;

c) the term beam waist location has been included;

d) the term optical resonator has been included;

e) the term 10 % pulse duration has been generalized to a selected percentage pulse duration;

f) the formula in the term beam diameter has been adjusted;

g) the order of the terms has been adjusted.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Optics and photonics — Lasers and laser-related equipment — Vocabulary and symbols

1 Scope

This document defines basic terms, symbols, and units of measurement for the field of laser technology in order to unify the terminology and to arrive at clear definitions and reproducible tests of beam parameters and laser-oriented product properties.

NOTE The laser hierarchical vocabulary laid down in this document differs from that given in IEC 60825–1. ISO and IEC have discussed this difference and agree that it reflects the different purposes for which the two standards serve. For more details, see informative Annex A.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

NOTE 1 The spatial distribution of the power (energy) density in a cross section of a laser beam does not always have circular symmetry. In this document, all terms related to these spatial distributions are split into those for beam cross sections with circular distributions and those for beam cross sections with non-circular distributions. A circular beam is characterized by its radius, w, or diameter, d. For a non-circular beam, the beam widths, d_x and d_y, for two orthogonal directions are given.

NOTE 2 The spatial distributions of laser beams do not have sharp edges. Therefore, the power (energy) values to which the spatial terms refer are defined. Depending on the application, different cut-off values can be chosen (for example $1/e$, $1/e^2$, 1/10 of the peak value).

NOTE 3 This document uses the subscript u to denote a percentage. For example, the percentage of the total beam power (energy) included in the value of a given parameter. When stating quantities marked by an index "u", "u" is replaced by the specific number, e.g. A_{90} for u = 90 %.

NOTE 4 The beam width $d_{x,u}$ (see 3.5.1) and the beam diameter d_u (see 3.3.1) can differ for the same value of u ($d_{x,u} \neq d_u$).

NOTE 5 In contrast to quantities defined by setting a cut-off value ["encircled power (energy)"], the beam widths and derived beam properties can also be defined based on the second moments of the power (energy) density distribution function (see 3.5.2). Only beam propagation ratios (see 3.10.2) that are calculated from beam widths and divergence angles derived from the second moments of the power (energy) density distribution function allow calculation of beam propagation. In this document, quantities based on the second moment are marked by a subscript "σ".

NOTE 6 A list of symbols is given in Annex B.

3.1 Beam position

3.1.1
beam centroid
$\bar{x}(z), \bar{y}(z)$
coordinates of the first-order moments of a power (energy) distribution of a beam at location z

$$\bar{x}(z) = \frac{\iint x \cdot E(x,y,z) \cdot \mathrm{d}x\mathrm{d}y}{\iint E(x,y,z) \cdot \mathrm{d}x\mathrm{d}y}$$

$$\bar{y}(z) = \frac{\iint y \cdot E(x,y,z) \cdot \mathrm{d}x\mathrm{d}y}{\iint E(x,y,z) \cdot \mathrm{d}x\mathrm{d}y}$$

where the integration shall be performed over an area such that at least 99 % of the beam power (energy) is captured

Note 1 to entry: The power density E is replaced by the energy density H for pulsed lasers.

Note 2 to entry: The terms beam centroid, centre of gravity and beam position are equivalent, formerly the term beam position was used.

Note 3 to entry: These quantities are defined in the beam axis system x,y,z, in which z is the direction of propagation of the beam.

3.1.2
beam positional stability
$\Delta_x(z')$, $\Delta_y(z')$
four times the standard deviation of the measured beam positional movement at plane z'

$$\Delta_x(z') = 4\sqrt{\frac{\sum_{i=1}^{N}\left[\bar{x}(z')_i - \overline{\bar{x}(z')}\right]^2}{N-1}}$$

$$\Delta_y(z') = 4\sqrt{\frac{\sum_{i=1}^{N}\left[\bar{y}(z')_i - \overline{\bar{y}(z')}\right]^2}{N-1}}$$

where $\bar{x}(z')$ and $\bar{y}(z')$ are the beam centroids in the z' plane, $\overline{\bar{x}(z')}$ and $\overline{\bar{y}(z')}$ are the mean beam centroids in the z' plane, and N is the number of measurements

Note 1 to entry: The term "beam angular stability", sometimes referred to as “beam pointing stability”, is defined in ISO 11670:2003.

[SOURCE: ISO 11670:2003, 3.6, modified — The NOTE has been deleted, the text after "at plane z'" has been added and Note 1 to entry has been added.]

3.2 Beam axis

3.2.1
beam axis
straight line connecting the centroids defined by the first spatial moments of the cross-sectional power (energy) density distribution function at successive locations in the direction of propagation (z) of the beam in a homogeneous medium