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

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Foreword

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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).

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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.