International Standard

ISO 11145

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

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

Sixth edition
2026-07

Reference number
ISO 11145:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

3.1 Beam position ... 2
3.2 Beam axis ... 2
3.3 Beam diameter ... 3
3.4 Beam radius ... 3
3.5 Beam width ... 4
3.6 Beam cross-sectional area ... 4
3.7 Beam waist ... 5
3.8 Divergence ... 7
3.9 Rayleigh length ... 7
3.10 Beam parameter product ... 8
3.11 Coherence ... 8
3.12 Polarization ... 9
3.13 Radiant power and energy ... 10
3.14 Pulse duration and repetition rate ... 11
3.15 Optical resonator ... 11
3.16 Mode ... 12
3.17 Spectral bandwidth ... 12
3.18 Relative intensity noise ... 12
3.19 Laser ... 12
3.20 Efficiency ... 13

4 Symbols and units of measurement ... **14**

Annex A (informative) **Explanation of the difference in terminology between IEC 60825-1 and ISO 11145** ... **16**

Bibliography ... **18**

Alphabetical index ... **19**

© ISO 2026 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 123, *Lasers and photonics,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement)

This sixth edition cancels and replaces the fifth edition (ISO 11145:2018), which has been technically revised.

The main changes are as follows:

— the term “power density” was replaced by “irradiance” and “energy density” was replaced by “fluence”.

— the word “radiant” was added to clarify terms for power and energy.

— “encircled-power” was added to terms 3.3.1, 3.4.1, 3.5.1, 3.6.1, 3.7.4, 3.7.6, 3.7.8 and 3.8.1.

— term and definition 3.5.3 “principal axis” was newly added.

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.

© ISO 2026 – All rights reserved

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 terminology databases for use in standardization at the following addresses:

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

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

NOTE 1 The spatial distribution of the irradiance (fluence) 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 radiant 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_{ux} (see 3.5.1) and the beam diameter d_u (see 3.3.1) can differ for the same value of u ($d_{ux} \neq d_u$).

NOTE 5 In contrast to quantities defined by setting a cut-off value ["encircled radiant power (energy)"], the beam widths and derived beam properties can also be defined based on the second-order moments of the irradiance (fluence) 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-order moments of the irradiance (fluence) distribution function allow calculation of beam propagation. In this document, quantities based on the second-order moment are marked by a subscript "σ".

NOTE 6 A list of symbols is given in Clause 4.

© ISO 2026 – All rights reserved