

# Optics and optical instruments — Lasers and laser-related equipment — Vocabulary and symbols

ICS 31.260; 01.040.31

# National foreword

This British Standard is the official English language version of EN ISO 11145:2001. It is identical with ISO 11145:2001. It supersedes BS EN ISO 11145:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CPW/172, Optics and optical instruments, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

## Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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This British Standard, having been prepared under the direction of the Consumer Products and Services Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 29 November 2001

## Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to vi, pages 1 to 22, the annex ZA page, and a back cover.

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Begriffe und Formelzeichen (ISO 11145:2001)

This European Standard was approved by CEN on 24 October 2001.

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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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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## Foreword

The text of the International Standard ISO 11145:2001 has been prepared by Technical Committee ISO/TC 172 "Optics and optical instruments" in collaboration with Technical Committee CEN/TC 123 "Lasers and laser related equipment", the secretariat of which is held by DIN.

This European Standard supersedes EN ISO 11145:1994.

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 May 2002, and conflicting national standards shall be withdrawn at the latest by May 2002.

This European Standard 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(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**NOTE FROM CMC** The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

## Endorsement notice

The text of the International Standard ISO 11145:2001 was approved by CEN as a European Standard without any modification.

INTERNATIONAL  
STANDARD

**ISO**  
**11145**

NORME  
INTERNATIONALE

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**Optics and optical instruments — Lasers  
and laser-related equipment — Vocabulary  
and symbols**

**Optique et instruments d'optique — 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

International Standard ISO 11145 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 9, *Electro-optical systems*.

This second edition cancels and replaces the first edition (ISO 11145:1994), which has been technically revised.

Annex A of this International Standard is for information only.

## Avant-propos

L'ISO (Organisation internationale de normalisation) est une fédération mondiale d'organismes nationaux de normalisation (comités membres de l'ISO). L'élaboration des Normes internationales est en général confiée aux comités techniques de l'ISO. Chaque comité membre intéressé par une étude a le droit de faire partie du comité technique créé à cet effet. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'ISO participent également aux travaux. L'ISO collabore étroitement avec la Commission électrotechnique internationale (CEI) en ce qui concerne la normalisation électrotechnique.

Les Normes internationales sont rédigées conformément aux règles données dans les Directives ISO/CEI, Partie 3.

Les projets de Normes internationales adoptés par les comités techniques sont soumis aux comités membres pour vote. Leur publication comme Normes internationales requiert l'approbation de 75 % au moins des comités membres votants.

L'attention est appelée sur le fait que certains des éléments de la présente Norme internationale peuvent faire l'objet de droits de propriété intellectuelle ou de droits analogues. L'ISO ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de propriété et averti de leur existence.

La Norme internationale ISO 11145 a été élaborée par le comité technique ISO/TC 172, *Optique et instruments d'optique*, sous-comité SC 9, *Systèmes électro-optiques*.

Cette deuxième édition annule et remplace la première édition (ISO 11145:1994), dont elle constitue une révision technique.

L'annexe A de la présente Norme internationale est donnée uniquement à titre d'information.

# Optics and optical instruments — Lasers and laser-related equipment — Vocabulary and symbols

## 1 Scope

This International Standard 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.

## 2 Symbols and units of measurement

**2.1** The spatial distribution of power (energy) density of a laser beam does not always have circular symmetry. Therefore, all terms related to these distributions are split into those for beams with circular and those with non-circular cross-sections. 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 have to be given.

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

To clarify this situation, this International Standard uses the subscript  $u$  for all related terms to denote the percentage of the total beam power (energy) taken into account for a given parameter.

**NOTE** For the same power (energy) content, beam width  $d_{x,u}$  and beam diameter  $d_u (= 2w_u)$  may differ for the same value of  $u$  (for example, for a circularly symmetric Gaussian beam  $d_{86,5}$  is equal to  $d_{x,95,4}$ ).

# Optique et instruments d'optique — Lasers et équipements associés aux lasers — Vocabulaire et symboles

## 1 Domaine d'application

La présente Norme internationale définit les termes fondamentaux, les symboles et les unités de mesure à utiliser dans le domaine de la technologie laser de manière à unifier la terminologie et à établir des définitions claires et des essais reproductibles concernant les paramètres du faisceau et les propriétés des appareils à laser.

## 2 Symboles et unités de mesure

**2.1** Les distributions spatiales des densités de puissance (d'énergie) des faisceaux laser ne comportent pas toujours de symétrie circulaire. C'est pourquoi, pour tous les termes relatifs à ces distributions, deux séries de définitions sont prévues suivant que la section de faisceau est circulaire ou non. Un faisceau circulaire est caractérisé par son rayon,  $w$ , ou son diamètre,  $d$ . Pour un faisceau non circulaire, les largeurs de faisceau,  $d_x$  et  $d_y$ , suivant deux directions perpendiculaires, doivent être données.

**2.2** Les distributions spatiales des faisceaux laser n'ont pas de contour bien défini. C'est pourquoi, il est nécessaire de préciser à quelles valeurs de puissance (d'énergie) les grandeurs spatiales se réfèrent. Suivant l'application, différentes valeurs de coupure peuvent être choisies (par exemple  $1/e$ ,  $1/e^2$ ,  $1/10$  de la valeur crête).

À des fins de clarification, la présente Norme internationale utilise l'indice  $u$  pour tous les termes concernés, afin d'indiquer le pourcentage de puissance (d'énergie) totale prise en compte pour un paramètre donné.

**NOTE** Pour la même quantité de puissance (d'énergie), la largeur de faisceau  $d_{x,u}$  et le diamètre de faisceau  $d_u (= 2w_u)$  peuvent différer pour la même valeur de  $u$  (par exemple, pour un faisceau gaussien à symétrie circulaire,  $d_{86,5}$  est égal à  $d_{x,95,4}$ ).