SVENSK STANDARD SS-EN 60825-1

Fastställd	Utgåva	Sida	Ansvarig kommitté
2014-09-16	5	1 (1+107)	SEK TK 76

Laser –
Säkerhet –
Del 1: Klassificering av utrustning samt fordringar

Safety of laser products –
Part 1: Equipment classification and requirements

Som svensk standard gäller europastandarden EN 60825-1:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60825-1:2014.

Nationellt förord

Europastandarden EN 60825-1:2014

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60825-1, Third edition, 2014 - Safety of laser products - Part 1: Equipment classification and requirements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60825-1, utgåva 4, 2007, gäller ej fr o m 2017-06-19.

ICS 13.110.00; 31.260.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
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Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

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Stora delar av arbetet sker internationellt

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Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60825-1

August 2014

ICS 13.110; 31.260

Supersedes EN 60825-1:2007

English Version

Safety of laser products - Part 1: Equipment classification and requirements (IEC 60825-1:2014)

Sécurité des appareils à laser - Partie 1: Classification des matériels et exigences
(CEI 60825-1:2014)

Sicherheit von Lasereinrichtungen - Teil 1: Klassifizierung von Anlagen und Anforderungen
(IEC 60825-1:2014)

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

Ref. No. EN 60825-1:2014 E

SEK Svensk Elstandard

Foreword

The text of document 76/502/FDIS, future edition 3 of IEC 60825-1, prepared by IEC/TC 76 "Optical radiation safety and laser equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60825-1:2014.

The following dates are fixed:

– latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-03-19
– latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-06-19

This document supersedes EN 60825-1:2007.

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

Endorsement notice

The text of the International Standard IEC 60825-1:2014 was approved by CENELEC as a European Standard without any modification.

IEC 60027-1	NOTE	Harmonised in EN 60027-1.
IEC 60065	NOTE	Harmonised as EN 60065.
IEC 60079 (Series)	NOTE	Harmonised as EN 60079 (Series).
IEC 60204-1	NOTE	Harmonised as EN 60204-1.
IEC 60601-2-22	NOTE	Harmonised as EN 60601-2-22.
IEC 60825-2	NOTE	Harmonised as EN 60825-2.
IEC 60825-4	NOTE	Harmonised as EN 60825-4.
IEC 60825-12	NOTE	Harmonised as EN 60825-12.
IEC 60950 (Series)	NOTE	Harmonised as EN 60950 (Series).
IEC 61010-1	NOTE	Harmonised as EN 61010-1.
IEC 61508 (Series)	NOTE	Harmonised as EN 61508 (Series).
IEC 62115	NOTE	Harmonised as EN 62115.
IEC 62368-1	NOTE	Harmonised as EN 62368-1.
IEC/ISO 11553 (Series)	NOTE	Harmonised as EN ISO 11553 (Series).
ISO 11146-1	NOTE	Harmonised as EN ISO 11146-1.
ISO 12100	NOTE	Harmonised as EN ISO 12100.
ISO 13694	NOTE	Harmonised as EN ISO 13694.
ISO 13849 (Series)	NOTE	Harmonised as EN ISO 13849 (Series).
ISO 15004-2:2007	NOTE	Harmonised as EN ISO 15004-2:2007.
ISO 80000-1	NOTE	Harmonised as EN ISO 80000-1.

Annex ZA
(normative)
Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050	series	International Electrotechnical Vocabulary	-	series
IEC 62471 (mod)	-	Photobiological safety of lamps and lamp systems	EN 62471	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF LASER PRODUCTS –

Part 1: Equipment classification and requirements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60825-1 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

This third edition of IEC 60825-1 cancels and replaces the second edition published in 2007. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a new class, Class 1C, was introduced;
- the measurement condition 2 ("eye loupe" condition) was removed;
- classification of the emission of laser products below a certain radiance level that are intended to be used as replacement for conventional light sources can, as an option, be based on the IEC 62471 series;
- the accessible emission limits (AELs) for Class 1, 1M, 2, 2M and 3R of pulsed sources, particularly of pulsed extended sources, were updated to reflect the latest revision of the

ICNIRP guidelines on exposure limits (accepted for publication in Health Physics 105 (3): 271 – 295; 2013, see also www.icnirp.org).

This part of IEC 60825 has the status of a Group Safety Publication, in accordance with IEC Guide 104[1)], for aspects of laser radiation pertaining to human safety.

The text of this standard is based on the following documents:

FDIS	Report on voting
76/502/FDIS	76/506/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all parts of the IEC 60825 series, published under the title *Safety of laser products*, can be found on the IEC website.

This part of IEC 60825 is also referred to as "Part 1" in this publication.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

1) IEC Guide 104:2010, *The preparation of safety publications and the use of basic safety publications and group safety publications*
It gives guidance to IEC technical committees and to writers of specifications concerning the manner in which safety publications should be drafted.
This guide does not constitute a normative reference and reference to it is given for information only.

SAFETY OF LASER PRODUCTS –

Part 1: Equipment classification and requirements

1 Scope and object

IEC 60825-1 is applicable to safety of laser products emitting laser radiation in the wavelength range 180 nm to 1 mm.

Although lasers exist which emit at wavelengths less than 180 nm (within the vacuum ultraviolet), these are not included in the scope of the standard since the laser beam normally has to be enclosed in an evacuated enclosure, and, therefore, the potential optical radiation hazards are inherently minimal.

A laser product may consist of a single laser with or without a separate power supply or may incorporate one or more lasers in a complex optical, electrical, or mechanical system. Typically, laser products are used for demonstration of physical and optical phenomena, materials processing, data reading and storage, transmission and display of information, etc. Such systems have found use in industry, business, entertainment, research, education, medicine and consumer products.

Laser products that are sold to other manufacturers for use as components of any system for subsequent sale are not subject to IEC 60825-1, since the final product will itself be subject to this standard. Laser products that are sold by or for manufacturers of end products for use as repair parts for the end products are also not subject to IEC 60825-1. However, if the laser system within the laser product is operable when removed from the end product, the requirements of this Part 1 apply to the removable laser system.

NOTE 1 Operable equipment does not require a tool to prepare for operation.

Any laser product is exempt from all further requirements of this Part 1 if classification by the manufacturer of that product according to Clauses 4 and 5 shows that the emission level does not exceed the AEL (accessible emission limit) of Class 1 under all conditions of operation, maintenance, service and failure. Such a laser product may be referred to as an exempt laser product.

NOTE 2 The above exemption is to ensure that inherently safe laser products are exempt from Clauses 6,7,8 and 9.

In addition to the adverse effects potentially resulting from exposure to laser radiation, some laser equipment may also have other associated hazards, such as electricity, chemicals and high or low temperatures. Laser radiation may cause temporary visual impairment, such as dazzle and glare. Such effects depend on the task and ambient lighting level and are beyond the scope of this Part 1. The classification and other requirements of this standard are intended to address only the laser radiation hazards to the eyes and skin. Other hazards are not included within its scope.

This Part 1 describes the minimum requirements. Compliance with this Part 1 may not be sufficient to achieve the required level of product safety. Laser products may also be required to conform to the applicable performance and testing requirements of other applicable product safety standards.

NOTE 3 Other standards may contain additional requirements. For example, a Class 3B or Class 4 laser product may not be suitable for use as a consumer product.

Where a laser system forms a part of equipment which is subject to another IEC product safety standard, e.g. for medical equipment (IEC 60601-2-22), IT equipment (IEC 60950 series), audio and video equipment (IEC 60065), audio-video and IT equipment (IEC 62368-1), equipment for use in hazardous atmospheres (IEC 60079), or electric toys (IEC 62115), this Part 1 will apply in accordance with the provisions of IEC Guide 104[2)] for hazards resulting from laser radiation. If no product safety standard is applicable, then IEC 61010-1 may be applied.

For ophthalmic instruments, to ensure patient safety, ISO 15004-2 should be consulted and the principles of the limits provided there should be applied for laser radiation (see also Annex C and D).

In previous editions, light-emitting diodes (LEDs) were included in the scope of IEC 60825-1, and they may be still included in other parts of the IEC 60825 series. However, with the development of lamp safety standards, optical radiation safety of LEDs in general can be more appropriately addressed by lamp safety standards. The removal of LEDs from the scope of this Part 1 does not preclude other standards from including LEDs whenever they refer to lasers. IEC 62471 may be applied to determine the risk group of an LED or product incorporating one or more LEDs. Some other (vertical) standards may require the application of the measurement, classification, engineering specifications and labelling requirements of this standard (IEC 60825-1) to LED products.

Laser products with accessible radiance below the criteria specified in 4.4, designed to function as conventional light sources, and which satisfy the requirements specified in 4.4 may alternatively be evaluated under the IEC 62471 series of standards, "Photobiological safety of lamps and lamp systems". Such a product remains within the scope of this part of IEC 60825, except that the above-described optical radiation emission need not be considered for classification.

The MPE (maximum permissible exposure) values provided in Annex A were developed for laser radiation and do not apply to collateral radiation. However, if a concern exists that accessible collateral radiation might be hazardous, the laser MPE values may be applied to conservatively evaluate this potential hazard, or the exposure limit values in IEC 62471 should be consulted.

The MPE values in Annex A are not applicable to intentional human exposure to laser radiation for the purpose of medical or cosmetic/aesthetic treatment.

NOTE 4 Informative Annexes A to G have been included for purposes of general guidance and to illustrate many typical cases. However, the annexes are not regarded as definitive or exhaustive.

The objectives of this part of IEC 60825 are the following:

- to introduce a system of classification of lasers and laser products emitting radiation in the wavelength range 180 nm to 1 mm according to their degree of optical radiation hazard in order to aid hazard evaluation and to aid the determination of user control measures;
- to establish requirements for the manufacturer to supply information so that proper precautions can be adopted;
- to ensure, through labels and instructions, adequate warning to individuals of hazards associated with accessible radiation from laser products;
- to reduce the possibility of injury by minimizing unnecessary accessible radiation and to give improved control of the laser radiation hazards through protective features.

2) IEC Guide 104:2010, *The preparation of safety publications and the use of basic safety publications and group safety publications*

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at http://www.electropedia.org)

IEC 62471 (all parts), *Photobiological safety of lamps and lamp systems*