SVENSK STANDARD

SS-EN IEC 60825-4, utg 3:2025

2025-09-24



# REDLINE VERSION

# Laser – Säkerhet – Del 4: Skyddsskärmar för laser

*Safety of laser products – Part 4: Laser guards*

En så kallad ”Redline version” (RLV) innehåller både standarden som fastställts som SEK-publikation och en ändringsmarkerad IEC-standard. Alla tillägg och borttagningar sedan den tidigare utgåvan av IEC-standarden är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut RLV i de fall den finns tillgänglig från IEC.

# IEC 60825-4

Edition 3.0 2022-07
REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

## Safety of laser products –
## Part 4: Laser guards

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.260

ISBN 978-2-8322-4407-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# SAFETY OF LASER PRODUCTS –

# Part 4: Laser guards

## 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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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60825-4:2006+AMD1:2008+AMD2:2011 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

IEC 60825-4 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment. It is an International Standard.

This third edition cancels and replaces the second edition published in 2006, Amendment 1:2008 and Amendment 2:2011. This edition constitutes a technical revision.

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

a) Significant amendments have been included and this edition has been prepared for user convenience.

The text of this International Standard is based on the following documents:

| Draft | Report on voting |
|---|---|
| 76/704/FDIS | 76/711/RVD |

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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# INTRODUCTION

At low levels of irradiance or radiant exposure, the selection of material and thickness for shielding against laser radiation is determined primarily by a need to provide sufficient optical attenuation. However, at higher levels, an additional consideration is the ability of the laser radiation to remove guard material – typically by melting, oxidation or ablation; processes that could lead to laser radiation penetrating a normally opaque material.

IEC 60825-1 deals with basic issues concerning laser guards, including human access, interlocking and labelling, and gives general guidance on the design of protective housings and enclosures for high-power lasers.

Laser guards may also comply with standards for laser protective eyewear, but such compliance is not necessarily sufficient to satisfy the requirements of this document.

Where the term "irradiance" is used, the expression "irradiance or radiant exposure, as appropriate" is implied.

# SAFETY OF LASER PRODUCTS –

# Part 4: Laser guards

## 1 Scope

This part of IEC 60825 specifies the requirements for laser guards, permanent and temporary (for example for service), that enclose the process zone of a laser processing machine, and specifications for proprietary laser guards.

This document applies to all component parts of a guard including clear (visibly transmitting) screens and viewing windows, panels, laser curtains and walls.

In addition, this document indicates

a) how to assess and specify the protective properties of a laser guard, and

b) how to select a laser guard.

NOTE Requirements for beam path components, beam stops and those other parts of a protective housing of a laser product which do not enclose the process zone are contained in IEC 60825-1.

This document deals with protection against laser radiation only. Hazards from secondary radiation that may arise during material processing are not addressed.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60825-1:~~2007~~2014, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

ISO 11553-1~~:2005~~, *Safety of machinery – Laser processing machines – Laser safety requirements*

ISO 12100, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

~~ISO 12100-1:2003, *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology*~~

~~ISO 12100-2:2003, *Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications*~~

ISO 13849-1~~:2006~~, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

~~ISO 14121-1:2007, *Safety of machinery – Risk assessment – Part 1: Principles*~~

SVENSK STANDARD

SS-EN IEC 60825-4, utg 3:2025

| Fastställd | Sida | Ansvarig kommitté |
|---|---|---|
| 2025-09-24 | 1 (79) | SEK TK 76 |



# Laser –
# Säkerhet –
# Del 4: Skyddsskärmar för laser

*Safety of laser products –*
*Part 4: Laser guards*

Som svensk standard gäller europastandarden EN IEC 60825-4:2024. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60825-4:2024.

**Nationellt förord**

Europastandarden EN IEC 60825-4:2024

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 60825-4, Third edition, 2022 - Safety of laser products - Part 4: Laser guards**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60825-4, utg 2:2006 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2027-12-31.

ICS 31.260.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1042, 172 21 Sundbyberg
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: elstandard.se

## Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

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SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

## Stora delar av arbetet sker internationellt

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


## SEK Svensk Elstandard

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN IEC 60825-4

December 2024

ICS 31.260

Supersedes EN 60825-4:2006; EN 60825-4:2006/A1:2008; EN 60825-4:2006/A2:2011

English Version

## Safety of laser products - Part 4: Laser guards (IEC 60825-4:2022)

Sécurité des appareils à laser - Partie 4: Protecteurs pour lasers
(IEC 60825-4:2022)

Sicherheit von Lasereinrichtungen - Teil 4: Laserschutzwände
(IEC 60825-4:2022)

This European Standard was approved by CENELEC on 2022-08-26. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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

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



Ref. No. EN IEC 60825-4:2024 E

# European foreword

The text of document 76/704/FDIS, future edition 3 of IEC 60825-4, prepared by TC 76 "Optical radiation safety and laser equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60825-4:2024.

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) | 2025-12-31 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2027-12-31 |

This document supersedes EN 60825-4:2006 and all of its amendments and corrigenda (if any).

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

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## Endorsement notice

The text of the International Standard IEC 60825-4:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

| | | |
|---|---|---|
| IEC 60204-1 | NOTE | Approved as EN 60204-1 |
| IEC 61310-3 | NOTE | Approved as EN 61310-3 |
| IEC 61496-2 | NOTE | Approved as EN IEC 61496-2 |
| ISO/TR 7250-2 | NOTE | Approved as CEN ISO/TR 7250-2 |
| ISO 10218-1 | NOTE | Approved as EN ISO 10218-1 |
| ISO 14120 | NOTE | Approved as EN ISO 14120 |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where 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.cencenelec.eu.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60825-1 | 2014 | Safety of laser products – Part 1: Equipment classification and requirements | EN 60825-1 | 2014 |
| IEC 61508 | series | Functional safety of electrical/electronic/programmable electronic safety-related systems | EN 61508-1:2010 | 2010 |
| | | | EN 61508-2:2010 | 2010 |
| | | | EN 61508-3:2010 | 2010 |
| | | | EN 61508-4:2010 | 2010 |
| | | | EN 61508-5:2010 | 2010 |
| | | | EN 61508-6:2010 | 2010 |
| | | | EN 61508-7:2010 | 2010 |
| ISO 11553-1 | - | Safety of machinery – Laser processing machines – Safety requirements | EN ISO 11553-1:2020 | 2020 |
| | | | + A11 | 2020 |
| ISO 12100 | - | Safety of machinery - General principles for design - Risk assessment and risk reduction | EN ISO 12100 | 2010 |
| ISO 13849-1 | - | Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design | EN ISO 13849-1 | 2023 |

# Annex ZZ
(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 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 ZZ.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 ZZ.1 — Correspondence between this European Standard and Annex I of Directive 2006/42/EC**

| The relevant Essential Requirements of Directive 2006/42/EC | Clause(s)/sub-clause(s) of this EN | Remarks/Notes |
|---|---|---|
| *1.5.12* | *Clause 4.1* | *General design requirements* |
| *1.5.12* | *Clause 4.2* | *General performance requirements* |
| *1.5.12* | *Clause 4.3* | *Validation* |
| *1.5.12* | *Clause 4.4* | *User information* |
| *1.5.12* | *Clause 5.1* | *Special design requirements* |
| *1.5.12* | *Clause 5.2* | *Special performance requirements* |
| *1.5.12* | *Clause 5.3* | *Specification requirements* |
| *1.5.12* | *Clause 5.4* | *Testing and evaluation requirements* |
| *1.5.12* | *Clause 5.5* | *Labelling requirements* |
| *1.5.12* | *Clause 5.6* | *Additional user documentation* |
| *1.5.12* | *Appendix D (normative)* | *Test specifications* |

**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.

# IEC 60825-4

Edition 3.0 2022-07

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Safety of laser products – Part 4: Laser guards

## Sécurité des appareils à laser – Partie 4: Protecteurs pour laser

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 31.260

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