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Varnost laserskih izdelkov - 2. del: Varnost komunikacijskih sistemov z optičnimi vlakni (OFCS)

Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCSs)

Sicherheit von Lasereinrichtungen - Teil 2: Sicherheit von Lichtwellenleiter-Kommunikationssystemen (LWLKS)

Sécurité des appareils à laser - Partie 2: Sécurité des systèmes de télécommunication par fibres optiques (STFO)

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Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCSs) (IEC 60825-2:2021 + COR1:2021)

Sécurité des appareils à laser - Partie 2: Sécurité des systèmes de télécommunications par fibres optiques (STFO)
(IEC 60825-2:2021 + COR1:2021)

Sicherheit von Lasereinrichtungen - Teil 2: Sicherheit von Lichtwellenleiter-Kommunikationssystemen (LWLKS)
(IEC 60825-2:2021 + COR1:2021)

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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

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European foreword

The text of document 76/670/FDIS, future edition 4 of IEC 60825-2, 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 60825-2:2026.

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) 2027-05-31
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2029-05-31

This document supersedes EN 60825-2:2004 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.

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 60825-2:2021 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 60794-4 (series)	NOTE	Approved as EN IEC 60794-4 (series)
IEC 60794-2 (series)	NOTE	Approved as EN IEC 60794-2 (series)
IEC 60794-3 (series)	NOTE	Approved as EN IEC 60794-3 (series)
IEC 62368-1	NOTE	Approved as EN IEC 62368-1
IEC 61508 (series)	NOTE	Approved as EN 61508 (series)
IEC 60812	NOTE	Approved as EN IEC 60812
IEC 60825-12	NOTE	Approved as EN IEC 60825-12

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	-	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCSs)

Sécurité des appareils à laser – Partie 2: Sécurité des systèmes de télécommunications par fibres optiques (STFO)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY OF LASER PRODUCTS –

Part 2: Safety of optical fibre communication systems (OFCSs)

FOREWORD

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International Standard IEC 60825-2 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

This fourth edition cancels and replaces the third edition published in 2004, Amendment 1:2006 and Amendment 2:2010. This edition constitutes a technical revision.

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

a) Recommendations for individual components and subassemblies have been clarified; see Clause 1, paragraph 3.
b) C_7 has been revised in accordance with IEC 60825-1:2014, but with an additional limitation related to the skin MPE; see 4.7.2.
c) Condition 2 has been changed, and a detailed description of the measurement and determination method for hazard level has been added; see 4.7.1 and 4.7.2.
d) Annex B has been moved into 4.9. Annex F has been moved forward as Annex B.
e) Clause D.4 Hazard level evaluation examples – Additional examples have been added.
f) Clause D.5 Fault analysis – Explanation and guidance has been simplified.

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

FDIS	Report on voting
76/670/FDIS	76/674/RVD

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

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

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

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

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

The contents of the corrigendum of June 2021 have been included in this copy.

INTRODUCTION

The objective of this document is to:

– protect people from optical radiation emitted by OFCSs;

– provide requirements for manufacturers, installation organizations, service organizations and operating organizations in order to establish procedures and supply information so that proper precautions can be adopted;

– ensure adequate warnings are provided to individuals regarding the potential hazards associated with OFCSs through the use of signs, labels and instructions.

Annex A gives a more detailed rationale for this document.

The safety of an OFCS depends to a significant degree on the characteristics of the equipment forming that system. Depending on the characteristics of the equipment, relevant safety information needs to be marked on the product or included within the instructions for use.

Where required by the level of potential hazard, the installation organization or end-user / operating organization or both are responsible for the safe deployment and use of OFCSs.

The installation organization and service organization are responsible for adherence to safety instructions during installation and service operations, respectively. The end-user or operating organization is responsible for adherence to safety instructions during operation and maintenance functions.

It is recognized that the user of this document can fall into one or more of the aforementioned categories of manufacturer, installation organization, end-user or operating organization.

SAFETY OF LASER PRODUCTS –

Part 2: Safety of optical fibre communication systems (OFCSs)

1 Scope

This document provides requirements and specific guidance for the safe operation and maintenance of optical fibre communication systems (OFCSs). In these systems, optical power is possibly accessible outside the confines of the transmitting equipment and/or at great distance from the optical source.

This document requires the assessment of hazard level at each accessible location of the OFCS as a replacement for product classification according to IEC 60825-1. It applies to the installed OFCS as an engineered, end-to-end assembly for the generation, transfer and receipt of optical radiation arising from lasers, light-emitting diodes (LEDs) or optical amplifiers, in which the transference is by means of optical fibre for communication and/or control purposes.

NOTE 1 Throughout this document, a reference to 'laser' is taken to include LEDs and optical amplifiers.

Individual components and subassemblies that fall under the definition of a laser product are subject to the applicable subclause(s) of IEC 60825-1. This document is applicable to individual components and subassemblies intended to be installed within OFCSs.

This document does not apply to optical fibre systems primarily designed to transmit optical power for applications such as material processing or medical treatment.

In addition to the hazards resulting from laser radiation, OFCSs possibly give rise to other hazards, such as fire.

This document does not address safety issues associated with explosion or fire with respect to OFCSs deployed in explosive atmospheres.

NOTE 2 The hazard presented by optical radiation emerging from a fibre is determined by the wavelength and power emerging from the fibre and also by the optical characteristics of the fibre itself (see Annex A).

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60825-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
accessible location
part or location within an OFCS at which, under reasonably foreseeable events, human access to laser radiation is possible without the use of a tool

3.2
automatic power reduction
APR
feature of an OFCS whereby the accessible power is reliably reduced to a specified level within a specified time, whenever there is an event which could result in human exposure to radiation

Note 1 to entry: The term "automatic power reduction" (APR) used in this document encompasses the following terms used in ITU-T Recommendation G.664 [1]:

– automatic laser shutdown (ALS);

– automatic power reduction (APR);

– automatic power shutdown (APSD).

Note 2 to entry: The term automatic laser shut off (ALSO) has also been used by some manufacturers in the industry.

Note 3 to entry: A fibre-cable break is an example of an event which could result in human exposure to radiation.

3.3
end-user
person or organization using the OFCS in the manner the system was designed to be used

Note 1 to entry: The end-user cannot necessarily control the power generated and transmitted within the system.

Note 2 to entry: If the person or organization is using the OFCS for a communications application in a manner other than as designed by the manufacturer, then that person/organization assumes the responsibilities defined in this document applicable to a manufacturer or installation organization.

3.4
hazard level
level of potential hazard at any accessible location within an OFCS

Note 1 to entry: It is based on the level of laser radiation which could become accessible in a reasonably foreseeable event, e.g. a fibre cable break. It is closely related to the laser classification procedure defined in 5.3 in IEC 60825-1:2014. The meaning of hazard level is clarified in Annex B.

3.5
hazard level 1
hazard level at which, under a reasonably foreseeable event, human access to laser radiation (accessible emission), evaluated by the measurement conditions for hazard level 1 as defined in 4.7.2 a) and 4.7.3, will not exceed the accessible emission limits of Class 1 in IEC 60825-1 for the applicable wavelength and emission duration, with additional constraints as defined in 4.7.2 a)

Note 1 to entry: "Additional constraints" refers to additional and stricter constraints that 4.7.2 a) of this document places on the values specified in IEC 60825-1:2014 for the accessible emission limits of Class 1 in the wavelength range 1 200 nm to 1 400 nm.