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INTERNATIONAL STANDARD

colour inside

Safety of laser products –
Part 12: Safety of free space optical communication systems used for transmission of information

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY OF LASER PRODUCTS –

Part 12: Safety of free space optical communication systems used for transmission of information

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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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60825-12 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

This second edition cancels and replaces the first edition published in 2004. This edition constitutes a technical revision.

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

a) LEDs have been removed from the scope.
b) Normative references have been changed to refer the latest edition of the standards.
c) A description of the Condition 2 measurement and determination method for access level has been added.

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

FDIS	Report on voting
76/616/FDIS	76/617/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.

The list of all parts of 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.

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 publication using a colour printer.

SAFETY OF LASER PRODUCTS –

Part 12: Safety of free space optical communication systems used for transmission of information

1 Scope

This part of IEC 60825 provides requirements and specific guidance for the manufacture and safe use of laser products and systems used for point-to-point or point-to-multipoint free space optical data transmission in the wavelength range from 180 nm to 1 mm. This document only addresses the open beam portion of the system. If portions of the equipment or system incorporate optical fibre that extends from the confinements of the enclosure(s), the manufacturing and safety requirements in IEC 60825-~~1~~2 apply to those portions only. This document does not apply to systems designed for the purposes of transmitting optical power for applications such as material processing or medical treatment. This document also does not apply to the use of systems in explosive atmospheres (see IEC 60079-0).

~~Throughout this part of IEC 60825, light-emitting diodes (LEDs) are included whenever the word "laser" is used.~~

Light-emitting diodes (LEDs) employed by free space optical communication systems (FSOCSs), used for the purpose of free space optical data transmission, do not fall into the scope of this document. This document covers lasers employed by FSOCSs used for the purpose of free space optical data transmission.

~~The objective of this part of IEC 60825 is to~~ This document:

- provide~~s~~ information to protect people from potentially hazardous optical radiation produced by~~ free space optical communication systems (~~FSOCS~~s~~)~~ by specifying engineering controls and requirements, administrative controls and work practices according to the degree of the hazard; and
- specif~~y~~ies requirements for manufacturing, installation, service and operating organizations in order to establish procedures and provide written information so that proper precautions can be adopted.

Because of the nature of FSOCSs, also known as optical wireless or free-air information transmission systems, care~~ must be~~ is taken in their manufacture as well as their installation, operation, maintenance and service to assure the safe deployment and use of these systems. This document places the responsibility for certain product safety requirements, as well as requirements for providing appropriate information on how to use these systems safely, on the manufacturer of the system and/or transmitters. It places the responsibility for the safe deployment and use of these systems on the installer and/or operating organization. It places the responsibility for adherence to safety instructions during installation and service operations on the installation and service organizations as appropriate, and during operation and maintenance functions on the operating organization. It is recognized that the user of this document may fall into one or more of the categories of manufacturer, installer, service organization and/or operating organization as mentioned above.

~~Any laser product is exempt from all further requirements of this part of IEC 60825~~ This document does not apply to a laser product if classification by the manufacturer according to IEC 60825-1 shows that the emission level does not exceed the accessible emission limit (AEL) of Class 1 under all conditions of operation, maintenance, service, and reasonably foreseeable failure~~, and it does not contain an embedded laser product~~.

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~~:1993~~, *Safety of laser products – Part 1: Equipment classification and requirements ~~and user's guide~~* ~~[1)]~~
~~Amendment 1 (1997)~~
~~Amendment 2 (2001)~~

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems*

~~[1)] A consolidated edition (1.2) exists comprising IEC 60825-1 (1993) and its Amendments 1 (1997) and 2 (2001).~~

IEC 60825-12

Edition 2.0 2019-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety of laser products – Part 12: Safety of free space optical communication systems used for transmission of information

Sécurité des appareils à laser – Partie 12: Sécurité des systèmes de communication optiques en espace libre utilisés pour la transmission d'informations

IEC 60825-12:2019-02(en-fr)

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SAFETY OF LASER PRODUCTS –

Part 12: Safety of free space optical communication systems used for transmission of information

1 Scope

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Light-emitting diodes (LEDs) employed by free space optical communication systems (FSOCSs), used for the purpose of free space optical data transmission, do not fall into the scope of this document. This document covers lasers employed by FSOCSs used for the purpose of free space optical data transmission.

This document:

- provides information to protect people from potentially hazardous optical radiation produced by FSOCSs by specifying engineering controls and requirements, administrative controls and work practices according to the degree of the hazard; and
- specifies requirements for manufacturing, installation, service and operating organizations in order to establish procedures and provide written information so that proper precautions can be adopted.

Because of the nature of FSOCSs, also known as optical wireless or free-air information transmission systems, care is taken in their manufacture as well as their installation, operation, maintenance and service to assure the safe deployment and use of these systems. This document places the responsibility for certain product safety requirements, as well as requirements for providing appropriate information on how to use these systems safely, on the manufacturer of the system and/or transmitters. It places the responsibility for the safe deployment and use of these systems on the installer and/or operating organization. It places the responsibility for adherence to safety instructions during installation and service operations on the installation and service organizations as appropriate, and during operation and maintenance functions on the operating organization. It is recognized that the user of this document may fall into one or more of the categories of manufacturer, installer, service organization and/or operating organization as mentioned above.

This document does not apply to a laser product if classification by the manufacturer according to IEC 60825-1 shows that the emission level does not exceed the accessible emission limit (AEL) of Class 1 under all conditions of operation, maintenance, service and reasonably foreseeable failure.

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

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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SÉCURITÉ DES APPAREILS À LASER –

Partie 12: Sécurité des systèmes de communication optiques en espace libre utilisés pour la transmission d'informations

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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La Norme internationale IEC 60825-12 a été établie par le comité d'études 76 de l'IEC: Sécurité des rayonnements optiques et matériels laser.

Cette deuxième édition annule et remplace la première édition parue en 2004. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) Les LED ont été retirées du domaine d'application.
b) Les références normatives ont été modifiées pour citer les éditions les plus récentes des normes.

c) Une description de la mesure en Condition 2 et de la méthode de détermination pour le niveau d'accès a été ajoutée.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
76/616/FDIS	76/617/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60825, publiées sous le titre général *Sécurité des appareils à laser*, peut être consultée sur le site web de l'IEC.

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SÉCURITÉ DES APPAREILS À LASER –

Partie 12: Sécurité des systèmes de communication optiques en espace libre utilisés pour la transmission d'informations

1 Domaine d'application

La présente partie de l'IEC 60825 donne des exigences et des recommandations spécifiques relatives à la fabrication et à l'utilisation en toute sécurité des appareils à laser et des systèmes employés pour la transmission optique de données en espace libre, d'un point à un autre ou d'un point à plusieurs autres points, dans la plage de longueurs d'onde comprise entre 180 nm et 1 mm. Le présent document ne traite que de la partie du faisceau qui se propage dans un espace ouvert du système. Si des parties de l'équipement ou du système comprennent une fibre optique qui sort des limites de confinement de l'enveloppe ou des enveloppes, les exigences de fabrication et de sécurité de l'IEC 60825-2 ne s'appliquent qu'à ces parties. Le présent document ne s'applique pas aux systèmes conçus dans le but de transmettre un flux énergétique optique pour des applications telles que le traitement des matériaux ou le traitement médical. Le présent document ne s'applique pas non plus à l'utilisation des systèmes en atmosphères explosives (voir l'IEC 60079-0).

Les diodes électroluminescentes (LED) employées par les systèmes de communication optique en espace libre (SCOEL), pour la transmission optique de données en espace libre, ne font pas partie du domaine d'application du présent document. Le présent document couvre les lasers employés par les SCOEL utilisés dans le cadre de la transmission optique de données en espace libre.

Le présent document:

- fournit des informations pour protéger les personnes contre le rayonnement optique potentiellement dangereux produit par les SCOEL, en spécifiant les moyens de contrôle et les exigences techniques, les moyens de contrôle administratif et les règles de travail en fonction du degré de danger; et
- spécifie des exigences à l'usage des organismes assurant la fabrication, l'installation, l'entretien et l'exploitation, afin d'établir des procédures et de fournir des informations écrites, de sorte que des précautions appropriées puissent être prises.

En raison de la nature des SCOEL, également connus sous le nom de systèmes optiques de transmission d'informations sans fil ou à l'air libre, des précautions sont prises lors de leur fabrication comme lors de leur installation, exploitation, maintenance et entretien, pour assurer un déploiement et une utilisation en toute sécurité. Le présent document établit la responsabilité du fabricant du système et/ou des émetteurs vis-à-vis de certaines exigences de sécurité du produit, ainsi que des exigences destinées à fournir des informations appropriées sur la manière d'utiliser ces systèmes en toute sécurité. Il fixe la responsabilité de l'installateur et/ou de l'organisme d'exploitation vis-à-vis du déploiement et de l'utilisation en toute sécurité de ces systèmes. Il définit, comme il convient, la responsabilité des organismes d'installation et d'entretien vis-à-vis de leur respect des instructions de sécurité, pendant les opérations d'installation et d'entretien et de l'organisme d'exploitation vis-à-vis des fonctions d'exploitation et de maintenance. Il est manifeste que l'utilisateur du présent document peut relever d'une ou de plusieurs catégories, celle(s) du fabricant, de l'installateur, de l'organisme d'entretien et/ou de l'organisme d'exploitation, comme mentionnées ci-dessus.

Le présent document ne s'applique pas à un appareil à laser si la classification par le fabricant, selon l'IEC 60825-1, montre que son niveau d'émission ne dépasse pas la limite d'émission accessible (LEA) de la classe 1 dans toutes les conditions d'exploitation, de maintenance, d'entretien et de défaillance raisonnablement prévisible.

2 Références normatives

Les documents suivants cités dans le texte constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60825-1, *Sécurité des appareils à laser – Partie 1: Classification des matériels et exigences*

IEC 60825-2, *Sécurité des appareils à laser – Partie 2: Sécurité des systèmes de télécommunication par fibres optiques (STFO)*