

# 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 optique en espace libre  
utilisés pour la transmission d'informations**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SAFETY OF LASER PRODUCTS –

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

## FOREWORD

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IEC 60825-12 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 2019. This edition constitutes a technical revision.

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

- a) Where relevant and appropriate, references to IEC 60825-1 have been changed to a specific dated reference i.e. IEC 60825-1:2014.
- b) Condition 2 has been changed from 7 mm aperture stop and 70 mm distance as follows,
  - For wavelengths less than 1 400 nm, 3,5 mm aperture stop and 35 mm distance,
  - For wavelengths equal to or greater than 1 400 nm, 3,5 mm aperture stop and 14 mm distance.

- c) For wavelengths between 1 200 nm and 1 400 nm, an additional limitation is required equal to the equivalent radiant power of the skin MPE. C<sub>7</sub> has therefore been revised in accordance with IEC 60825-1:2014, but with this additional limitation related to the skin MPE; see 4.2.
- d) Additional detail added regarding time base, see 4.8.
- e) Additional clarification added to Clause 8 regarding the content and formatting of labels.
- f) Annex A has been added, providing a rationale for the differences in approach between this document and IEC 60825-1:2014.
- g) Annex B has been added, providing clarification of the meaning of the term "access level".
- h) Worked examples have been added for a variety of scenarios; see Clauses C.2 to C.5.
- i) Clause C.6 has been added on UAS, unmanned aerial systems.

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

Draft	Report on voting
76/717/FDIS	76/722/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standards/publications](http://www.iec.ch/standards/publications).

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.

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

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- withdrawn,
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- amended.

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## INTRODUCTION

The objective of this document is to:

- protect people from hazardous optical radiation emitted by FSOCSs;
- provide safety requirements and guidance for the design, manufacture and use of laser products or laser systems, which emit laser radiation for the purpose of free space optical data transmission;
- provide guidance for installation, operation, maintenance and service to assure the safe deployment and use of such laser systems.

This document only addresses the open beam portion of the laser product or laser system.

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 or the transmitters. It places the responsibility for the safe deployment and use of these systems on the installer or the 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.

Annex A gives a more detailed rationale for this document, and some examples are given in Annex C.

## 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 is applicable to products that emit laser radiation for the purpose of free space optical data transmission.

This document does not apply to laser products designed for the purposes of transmission of optical power for applications such as material processing or medical treatment. This document also does not apply to the use of laser products in explosive atmospheres (see IEC 60079-0). Light-emitting diodes employed by free space optical communication systems, used for the purpose of free space optical data transmission, do not fall into the scope of this document.

NOTE If the laser product incorporates an optical fibre that extends from the confinement by a system or enclosed space, the requirements in IEC 60825-2 apply.

#### 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*

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

#### 3 Terms and definition

For the purposes of this document, the terms and definitions given in IEC 60825-1:2014 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 Access level

potential hazard at any accessible position as a result of the optical emissions from a free space optical communication system (FSOCS) installation

Note 1 to entry: The access level is based on the level of laser radiation which could become accessible in reasonably foreseeable circumstances, e.g. walking into an open beam path. It is closely related to the laser classification procedure in IEC 60825-1. The meaning of access level is clarified in Annex B.

Note 2 to entry: Practically speaking, it takes two or more seconds to fully align an optical aid with a beam (which might occur in an unrestricted location), and this delay is incorporated into the method for determining access level.