



BSI Standards Publication

## Safety of laser products

Part 17: Safety aspects for use of passive optical components and optical cables in high power optical fibre communication systems

**National foreword**

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The UK participation in its preparation was entrusted to Technical Committee EPL/76, Optical radiation safety and laser equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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# TECHNICAL REPORT

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**Safety of laser products –  
Part 17: Safety aspects for use of passive optical components and optical  
cables in high power optical fibre communication systems**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SAFETY OF LASER PRODUCTS –

**Part 17: Safety aspects for use of passive optical components and optical cables in high power optical fibre communication systems**

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IEC TR 60825-17, which is a Technical Report, has been prepared by IEC technical committee TC 76: Optical radiation safety and laser equipment.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

The changes with respect to the previous edition include changes to harmonize with SC86A and SC86B documents.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
76/510/DTR	76/526/RVC

Full information on the voting for the approval of this Technical Report 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.

A 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 publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

The rapid growth of applications such as the internet and business intranets requiring high bitrates has caused a dramatic increase in the need for high capacity data connections. This increase in capacity has resulted in a requirement for a corresponding increase in power levels used in optical fibre communications systems. There are a number of areas of concern including but not exclusively the use of erbium-doped fibre amplifiers (EDFA), high power dense wavelength division multiplexing (DWDM) systems, and Raman amplification.

The power levels associated with these systems are typically greater than 500 mW (i.e. Class 4), but some studies have shown additional thermal effects can occur at lower powers. These additional thermal and related hazards mean that it is necessary to address a number of new issues. It should be noted that the vast majority of these systems use single-mode fibre.

## SAFETY OF LASER PRODUCTS –

### Part 17: Safety aspects for use of passive optical components and optical cables in high power optical fibre communication systems

#### 1 Scope

This part of IEC 60825 recommends safety measures to protect against effects caused exclusively by thermal, opto-mechanical and related effects in passive optical components and optical cables used in high power optical fibre communication systems.

This part of IEC 60825 does not apply to the use of high power optical systems in explosive atmospheres or the use of optical fibres in material processing machines. Throughout this part of IEC 60825, a reference to 'laser' is taken to include light-emitting diodes (LEDs) and optical amplifiers.

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

IEC 60825-2:2004, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

IEC 60825-2:2004/AMD1:2006

IEC 60825-2:2004/AMD2:2010<sup>1</sup>

ITU-T Recommendation G.664, *Optical safety procedures and requirements for optical transmission systems*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1

##### **automatic laser shutdown**

##### **ALS**

technique (procedure) to automatically shutdown the output power of laser transmitters and optical amplifiers to avoid exposure to hazardous levels

##### 3.2

##### **automatic power reduction**

##### **APR**

feature of an optical fibre communication system (OFCS) by which the accessible power is reduced to a specified level within a specified time, whenever there is an event which could result in human exposure to radiation, e.g. a fibre cable break

<sup>1</sup> A consolidated edition 3.2 exists, including IEC 60825-2:2004 and its Amendment 1 and Amendment 2.