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**Safety of laser products –**

**Part 14:  
A user's guide**



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## Safety of laser products –

### Part 14: A user's guide

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY OF LASER PRODUCTS –**

**Part 14: A user's guide**

FOREWORD

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 60825-14, which is a technical report, has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
76/271/DTR	76/282/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.

IEC consists of the following parts, under the general title *Safety of laser products*:

- Part 1: Equipment classification, requirements and user's guide
- Part 2: Safety of optical fibre communication systems
- Part 3: Guidance for laser displays and shows
- Part 4: Laser guards
- Part 5: Manufacturer's checklist for IEC 60825-1
- Part 6: Safety of products with optical sources, exclusively used for visible information transmission to the human eye
- Part 7: Safety of products emitting infrared optical radiation, exclusively used for wireless 'free air' data transmission and surveillance
- Part 8: Guidelines for the safe use of medical laser equipment
- Part 9: Compilation of maximum permissible exposure to incoherent optical radiation
- Part 10: Application guidelines and explanatory notes to IEC 60825-1
- Part 12: Safety of free space optical communication systems used for transmission of information<sup>1)</sup>
- Part 13: Measurements for classification of laser products<sup>1)</sup>
- Part 14: A user's guide

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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- withdrawn;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

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<sup>1)</sup> To be published

## INTRODUCTION

To help in the use of this technical report, an outline of the topics that are covered within it is given below. The topics are presented in the order in which they would normally be considered as part of a laser safety programme.

- Safety responsibilities with regard to the operation of lasers and the need for appropriate training are covered in Clause 3.
- The meaning of the laser product classes and the assessment of laser exposure are covered in Clause 4.
- The determination of the maximum permissible exposure (MPE), and the concept of the hazard distance and hazard zone within which the MPE can be exceeded, are covered in Clause 5.
- Associated laser hazards (that is, hazards other than those of eye or skin exposure to the emitted laser beam) are covered in Clause 6.
- A three-stage process for evaluating risk (arising from both the laser radiation hazards discussed in Clauses 4 and 5, and the associated laser hazards discussed in Clause 6) is covered in Clause 7. These three stages are:
  - 1) the identification of all potentially injurious situations,
  - 2) the assessment of the risk arising from these situations and
  - 3) the determination of the necessary protective measures.
- The use of control measures for reducing the risk to an acceptable level is covered in Clause 8.
- The need to ensure the continuation over time of safe laser operation is covered in Clause 9.
- The reporting of laser-related hazardous incidents and the investigation of accidents is covered in Clause 10.
- The role of medical surveillance (eye examinations) is covered in Clause 11.
- Additional information on the use of interlock protection is given in Annex A.
- Examples of laser safety calculations are given in Annex B.
- An explanation of the biophysical effects of laser exposure to the eyes and skin is given in Annex C.

## SAFETY OF LASER PRODUCTS –

### Part 14: A user's guide

#### 1 Scope and object

This technical report provides guidance on best practice in the safe use of laser products that conform to IEC 60825-1. The terms "laser product" and "laser equipment" as used in this document also refer to any device, assembly or system, which is capable of emitting optical radiation produced by a process of stimulated emission. However, unlike IEC 60825-1, this document does not cover light-emitting diodes (LEDs).

Class 1 laser products normally pose no hazard and Class 2 laser products present only a minimal hazard. With these products, it is normally sufficient to follow the warnings on the product labels and the manufacturer's instructions for safe use. Further protective measures as described in this document should not be necessary.

This document emphasizes evaluation of the risk from higher power lasers, but the users of the lower power lasers may benefit from the information contained. See Table 1 for an overview.

This technical report can be applied to the use of any product that incorporates a laser, whether or not it is sold or offered for sale. Therefore, it applies to specially constructed lasers (including experimental and prototype systems).

This technical report is intended to help laser users and their employers to understand the general principles of safety management (Clause 3), to identify the hazards that may be present (Clauses 4 to 6), to assess the risks of harm that may arise (Clause 7), and to set up and maintain appropriate control measures (Clauses 8 to 11).

Laser control measures vary widely. They depend on the type of laser equipment in use, the task or process being performed, the environment in which the equipment is used and the personnel who may be at risk of harm. Specific requirements for certain laser applications is given in other documents in the IEC 60825 series (see the Foreword or bibliography for the titles of these documents).

The terms "reasonably foreseeable" and "reasonably foreseeably" are used in this document in relation to certain specific events, situations or conditions. It is the responsibility of the person using this document to determine what is "reasonably foreseeable" and what might occur "reasonably foreseeably", and to be able to defend, on the basis of risk-assessment criteria, any such judgements that are made.

Reference is made in this document to laser "users". This should be taken to include persons having responsibility for safety in addition to those who actually work with or operate laser equipment.