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Safety of laser products – Part 14: A user's guide

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY OF LASER PRODUCTS –

Part 14: A user's guide

FOREWORD

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IEC TR 60825-14 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment. It is a Technical Report.

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) incorporates changes made in IEC 60825-1:2014;
b) adds information to users of laser equipment on administrative controls to ensure safety in the workplace, including the training and appointment of people to specific laser safety management roles;
c) updates an approach to risk assessment;
d) includes updated guidance on the management of incidents and accidents;
e) includes updated guidance on medical surveillance for laser workers;
f) includes revised examples of calculations.

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

Draft	Report on voting
76/661/DTR	76/693/RVDTR

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 Technical Report 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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under 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- withdrawn,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 document using a colour printer.

INTRODUCTION

To help in the use of this document, 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 4.

– The meaning of the laser product classes and the assessment of laser exposure are covered in Clause 5.

– 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 6.

– Associated laser hazards (that is, hazards other than those of eye or skin exposure to the emitted laser beam) are covered in Clause 7.

– A three-stage process for evaluating risk (arising from both the laser radiation hazards discussed in Clause 5 and Clause 6, and the associated laser hazards discussed in Clause 7) is covered in Clause 8. These three stages are

  1) the identification of 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 9.

– The need to ensure the continuation over time of safe laser operation is covered in Clause 10.

– The reporting of laser-related hazardous incidents and the investigation of accidents is covered in Clause 11 and Clause 12.

– The role of medical surveillance (eye examinations) is covered in Clause 13.

– 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

This document provides guidance on best practices 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 that is capable of emitting optical radiation produced by a process of stimulated emission.

Class 1 laser products normally pose no beam hazard and Class 2 and Class 3R laser products present only a minimal beam hazard. With these products, it is normally sufficient to follow the warnings on the product labels and the manufacturer's instructions for safe use. It is unlikely that further protective measures as described in this document will be necessary.

This document emphasizes evaluation of the risk from higher power lasers, but the users of the lower power lasers can benefit from the information provided

This document 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 document is intended to help laser users and their employers to understand the general principles of safety management, to identify the hazards that can be present, to assess the risks of harm that can arise, and to set up and maintain appropriate control measures. Although the guidance given in this document is aimed principally at organizations (whether private, corporate or public), where systems of safety management would be expected to be in place, it can be applied by anyone using lasers.

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 are at risk of harm. Specific requirements for certain laser applications are given in other documents in the IEC 60825 series.

The terms "reasonably foreseeable" and "reasonably foreseen" 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 occurrences might be "reasonably foreseen", 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 includes persons having responsibility for safety in addition to those who actually work with or operate laser equipment.

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*