TECHNICAL SPECIFICATION

IEC TS 60825-7

First edition
2000-06

Safety of laser products –

Part 7:
Safety of products emitting infrared optical radiation, exclusively used for wireless "free air" data transmission and surveillance

Sécurité des appareils à laser –

Partie 7:
Sécurité des sources optiques infrarouges pour transmission de données et surveillance, sans fil à l'air libre



Reference number
IEC/TS 60825-7:2000(E)

Numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series.

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE L

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY OF LASER PRODUCTS –

Part 7: Safety of products emitting infrared optical radiation, exclusively used for wireless "free air" data transmission and surveillance

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 60825-7, which is a technical specification, has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

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

Enquiry draft	Report on voting
76/198/CDV	76/215/RVC

Full information on the voting for the approval of this technical specification 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 3.

Annexes A and B are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2002. At this date, the publication will be

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

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

INTRODUCTION

Probably because of the increasing radiation power available from LEDs, and their physical similarity to laser diodes, these devices have been included in the scope of the laser safety standard IEC 60825-1. However, the optical radiation from LEDs differs in various aspects from laser sources; generally, they lie between incoherent broadband sources, and coherent laser sources.

The safety philosophy and classification requirements of IEC 60825-1, developed for coherent point sources (with the assumption of Gaussian radiation characteristics), has been transferred to incoherent intermediate sources (with typically Lambertian radiation characteristics) which are often made for intentional viewing. The result has been an overestimation of the real risk from this kind of source.

In Europe, and effective since January 1997, EN 60825-1, which includes LEDs, is valid. According to the European product safety laws, this means that each LED product has to be classified under single-fault conditions.

IEC technical committee 76 (jointly with subcommittee 100C/working group 17) was established with the objective of preparing additional parts to the 60825 series, for specific application-related requirements.

Due to problems with LED source, the basic standard IEC 60825-1 is also under consideration and technical development. If a new edition of IEC 60825-1 with a changed safety philosophy becomes valid in the future, it will influence all subsidiary standards. This development will influence and/or change the basis for a more realistic assessment of the optical hazard of LEDs in the future. With this background, the value of this technical specification could be temporary if a suitable treatment is developed in IEC 60825-1.

This technical specification is considered as a "prospective standard for provisional application" in the field of optical radiation safety of LEDs. This is because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

SAFETY OF LASER PRODUCTS –

Part 7: Safety of products emitting infrared optical radiation, exclusively used for wireless "free air" data transmission and surveillance

1 Scope and object

This technical specification provides the requirements and specific guidance for the safe use of products that are within the scope of IEC 60825-1, which emit infrared optical radiation, where such products are used exclusively for wireless "free air" data transmission and surveillance.

The peak wavelength for these products must be greater than 780 nm. This specification is limited to sources with *NOHD* less than 2,5 m. Also, Class 4-products are not covered by this specification and should be treated by the requirements of IEC 60825-1.

NOTE Applications with nearly collimated beams (e.g. free space point to point transmission lines) are not covered by this specification. In most cases, the selected application group diode emitter sources, which cover laser diodes and infrared LEDs as well, will be used. However, throughout this specification, all sources covered by the scope are included whenever the word "diode emitter" is used.

The object of this specification is as follows:

– to protect persons from exposure to hazardous infrared optical radiation, resulting from products used for free air infrared data transmission, remote control, surveillance;

– to lay down requirements, for both user and manufacturer, to establish procedures and supply information so that proper precautions can be adopted;

– to ensure adequate warning to individuals of hazards associated with accessible optical radiation from products with infrared optical sources, through signs, labels and instructions;

– to reduce the possibility of injury by minimizing unnecessary accessible radiation, and to give improved control of the optical radiation emitted by products with infrared optical sources, through protective features and also to provide safe usage of products.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this technical specification. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical specification are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60050(845):1987, *International Electrotechnical Vocabulary (IEV) – Chapter 845: Lighting*

IEC 60825-1:1993, *Safety of laser products – Part 1: Equipment classification, requirements and users guide*
Amendment 1:1997

IEC 60825-2:1993, *Safety of laser products – Part 2: Safety of optical fibre communication systems*

IEC 60825-6:1999, *Safety of laser products – Part 6: Safety of products with optical sources, exclusively used for visible information transmission to the human eye*

3 Definitions

For the purpose of this technical specification, the following definitions apply. They repeat or supplement those given in IEC 60825-1, IEC 60825-2 and IEC 60050(845).

3.1
angular subtense
the visual angle α subtended by the *apparent source* (including diffuse reflections) at the eye of an observer or at the point of measurement. The angular subtense is measured from the apparent source at either the distance of intended use or, at the distance of the expected exposure, whichever is applicable. This distance must not be smaller than 100 mm. (See also *maximum angular subtense* and *minimum angular subtense*.)

NOTE The requirements for the determination of the angular subtense are in 6.2.2 and 6.3.

3.2
apparent source
the real or virtual object (source of optical radiation) that forms the smallest possible retinal image

NOTE The size of the apparent source is the parameter that defines the limits of an *intermediate source*.

3.3
automatic power reduction
a feature of a bi-directional *wireless optical transmission system* by which the accessible power is reduced to a specified level within a specified time, whenever there is an event which could result in hazardous human exposure to radiation, for example a break of the transmission by misalignment or insertion of an object or part of a person's body into the beam path such that the intended signal is not received by the receiver

NOTE This feature may be used to determine the classification level.

3.4
bystander
a person who may be exposed to infrared radiation and who is not expected to be aware of the hazard or potential hazard of exposure

3.5
diode emitter (DE)
any semiconductor pn-junction device which can be made to produce optical electromagnetic radiation by radiative recombination of excited carriers

NOTE The following designations for diode emitters are commonly used:

LED (Light Emitting Diode) emitting in the wavelength range from 380 nm to 780 nm. In some cases (IEC 60825-1), the term LED is used for all diode emitters except LDs.

IRED (Infra-Red Emitting Diode) emitting in the wavelength range from 780 nm to 1 mm (main subject of this specification).

LD (Laser Diode) emitting stimulated radiation at any wavelength.

Note that, in this specification, the term diode emitter (DE) is used for both LEDs and LDs.

3.6
DE product
any product where the primary intent is to emit infrared radiation which originates from a *diode emitter* source forming part of the product

3.7
embedded DE product
in this specification, a *DE product* which, because of engineering features limiting the accessible emissions, has been assigned in a class number lower than the inherent capability of the incorporated DE