IEC TR 60825-5

Edition 3.0 2019-11

TECHNICAL REPORT

colour inside

Safety of laser products –
Part 5: Manufacturer's checklist for IEC 60825-1

IEC TR 60825-5:2019-11(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.260

ISBN 978-2-8322-7563-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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 60825-5, which is a Technical Report, has been prepared by IEC Technical Committee 76: Optical radiation safety and laser equipment.

This third edition cancels and replaces the second edition of IEC TR 60825-5 published in 2003. This edition constitutes a technical revision.

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

a) a new class, Class 1C, was introduced;
b) the measurement condition 2 ("eye loupe" condition) was removed;
c) for compliance with non-beam hazards (8.14.1) according to relevant product safety standards, a reference was made to corresponding product reports.

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

Draft TR	Report on voting
76/585/DTR	76/608/RVDTR

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 document is to be used in conjunction with IEC 60825-1:2014.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in 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 "http://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- withdrawn,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.

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

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

IEC 60825 consists of the following parts, under the general title *Safety of laser products*:

Part 1: Equipment classification and requirements

Part 2: Safety of optical fibre communication systems (OFCS)

Part 3: Guidance for laser displays and shows

Part 4: Laser guards

Part 5: Manufacturer's checklist for IEC 60825-1

Part 8: Guidelines for the safe use of laser beams on humans

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

Part 13: Measurements for classification of laser products

Part 14: A user’s guide

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

SAFETY OF LASER PRODUCTS –

Part 5: Manufacturer's checklist for IEC 60825-1

1 Scope

This part of IEC 60825, which is a Technical Report, is applicable to laser products as described in IEC 60825-1:2014.

The checklist is intended for use by manufacturers of laser products and their agents to establish that each new or modified design complies with the requirements of IEC 60825-1:2014. The checklist is used in conjunction with IEC 60825-1, as relevant clauses and subclauses in IEC 60825-1 are referred to in the text.

The layout of the checklist is intended only as a guide. Manufacturers and examiners are encouraged to produce their own document, omitting questions and clauses that are not relevant to the types of product under examination, but noting in the appropriate positions the numbers of such clauses stating, for example: "Subclause 9.11.1: Question omitted – not applicable".

The manufacturer is responsible for ensuring that the examiner is a person competent in the inspection and classification of laser products.

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*

3 Terms and definitions

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

Throughout this document, the abbreviation N.A. means "not applicable".

4 Identification

4.1 Details of the examiner

Identification of the person responsible for examining and classifying the product under inspection:

Name: _____ Position: _____
print full name print full title

If the above named person is not an employee of the manufacturer of the laser product to be examined, state the details of the examiner's employer or organization:

Organization: _____

Address: _____

_____

Date of examination: _____

4.2 Laser product

4.2.1	Manufacturer:	
	_____	
	Address:	
	_____	
	_____	
	Serial Number of laser products:	
	_____	
	Date of manufacture (if known):	
	List all names, brand names, model numbers and model family designations of the laser product being examined. _____ _____ _____	
4.2.2	Is the laser product sold as a component of any laser system for subsequent sale or sold by manufacturers of end products for use as a repair part for the end products? NOTE If the laser system within the laser product is operable when removed from the end product, the answer to this question is NO. Operable equipment does not require a tool to prepare for operation. _____ _____	YES/NO
4.2.2.1	If NO to 4.2.2, compliance with all remaining clauses of this checklist is to be verified. _____ _____	YES/NO/N.A.
4.2.2.2	If YES to 4.2.2, the laser product is not subject to IEC 60825-1. _____ _____	YES/NO/N.A.
	Numbers shown in parenthesis and italics refer to the relevant clause in IEC 60825-1. Where a YES or NO answer is shown in this text as underlined, failure to give that answer, if applicable for this product, implies failure to comply with the requirements of IEC 60825-1 and corrective action will be required by the manufacturer or his agent if compliance shall be achieved. The user should circle the applicable verdict (YES/NO/N.A.). If additional information is available to support answers given, write it in the space provided below the questions and/or attach the information to the back of the checklist, referencing the relevant clause in the checklist. Throughout this document, the abbreviation N.A. means "not applicable".	

5 Test *(5)* – Measurements for determining classification

5.1.	Have measurements of laser radiation been carried out in accordance with the requirements of Clause 5 of IEC 60825-1:2014?	YES/NO/N.A.
5.1.1.	If NO, have measurements been deemed unnecessary by virtue of the physical characteristics and limitations of the laser source, so that the laser product is placed clearly in a particular class according to IEC 60825-1:2014, Clause 5?	YES/NO/N.A.
5.1.2	If NO, measurements for the determination of classification are required and shall be carried out in accordance with the requirements of Clause 5 of IEC 60825-1:2014 before proceeding further.	
5.1.3	If NO is applicable to a reasonably foreseeable single fault condition, is the emission in that case reduced to a level below the AEL by automatic reduction in a duration within which it is not reasonably foreseeable to have human access?	YES/NO/N.A.
5.1.4	If YES, have measurements of laser radiation been carried out during operation of the laser product, and under each and every reasonably foreseeable single fault condition except for the fault conditions evaluated under 5.1.3? NOTE 1 Automatic reduction includes physical limitation of the emission such as component or system failure to a safe condition. It does not include manual reduction or termination of the emission. For example, a scanning safeguard may not react fast enough to prevent emission above the AEL during the fault condition; however, this might be acceptable for products where exposure of people is unlikely. Acceptable modes of analysis of the probability and risk regarding failures are FMEA (failure mode and effect analysis), etc. (see for instance IEC 61508 (all parts)). Probability analysis may be used to assist in determining "reasonably foreseeable single fault conditions". NOTE 2 Classification is determined during operation, and restrictions on maintenance are then dependent upon the classification of the product. NOTE 3 Single fault conditions can be assessed by methods other than physically inducing the fault for the test.	YES/NO/N.A.

5.1.5	If YES, state the following:	
	– classification (e.g. Class 1): _____	YES/NO/N.A.
	– wavelength or wavelength range of accessible laser radiation: _____	YES/NO/N.A.
	– the appropriate time base for the product: _____	YES/NO/N.A.
	– the angular subtense of the source where applicable: _____ A statement of the angle of subtense is not needed when a default measurement method is applied (see *5.4.2*); if C_6 > 1, the measurement according to *5.4.3* shall be performed.	YES/NO/N.A.
	– the emission time profile (CW, pulse repetition rate, pulse length, peak power, etc.): _____ _____	YES/NO/N.A.
	– the measurement aperture and measurement distance: _____	YES/NO/N.A.
	Has the position of the apparent source been determined? _____ NOTE 1 This might be in order to place the measurement aperture at the required measurement distance. In case of a default (simplified) evaluation, the measurement is taken from a reference point listed in Table 11 of IEC 60825-1:2014.	YES/NO/N.A.
	Maximum level of accessible laser radiation: _____	YES/NO/N.A.
	For Class 1, 1M, 2, 2M or Class 3R, does the accessible emission exceed the AEL of Class 3B as determined with a 3,5 mm diameter aperture placed at the closest point of human access? _____	YES/NO/N.A.
	If YES, additional warning for skin and/or cornea/iris hazard is required (*7.13*). NOTE 2 The measurement for skin and/or cornea/iris hazard is intended to verify if accessible emissions exceed the AEL of Class 3B as determined with a 3,5 mm diameter aperture placed at the closest point of human access. _____ _____	YES/NO/N.A.