

TECHNICAL REPORT



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

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TECHNICAL REPORT



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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SAFETY OF LASER PRODUCTS –

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

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- withdrawn,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

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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: _____

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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? _____	<u>YES</u> /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? _____	<u>YES</u> /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. _____	<u>YES</u> /NO/N.A.

5.1.5	If YES, state the following:	
	– classification (e.g. Class 1): _____	<u>YES</u> /NO/N.A.
	– wavelength or wavelength range of accessible laser radiation: _____	<u>YES</u> /NO/N.A.
	– the appropriate time base for the product: _____	<u>YES</u> /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.	<u>YES</u> /NO/N.A.
	– the emission time profile (CW, pulse repetition rate, pulse length, peak power, etc.): _____ _____	<u>YES</u> /NO/N.A.
	– the measurement aperture and measurement distance: _____	<u>YES</u> /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.	<u>YES</u> /NO/N.A.
	Maximum level of accessible laser radiation: _____	<u>YES</u> /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? _____	<u>YES</u> /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. _____ _____	<u>YES</u> /NO/N.A.

6 Classification (4) – Classification procedure

6.1	For Class 1, Class 1M, Class 2, Class 2M and Class 3R, have additional measurements (see informative Annex A) with a 3,5 mm diameter aperture placed at the closest point of human access been considered to determine warnings for skin and/or cornea/iris hazard according to Clause 7(7.13 and 8.1 k)? If NO, follow pertinent rules above according to Clause 6(5.3). _____ _____	YES/NO/N.A.
6.2	Is the product a Class 1C laser product? If YES, determine accessible emissions according to (5.3 b). _____ _____	YES/NO/N.A.
6.3	Is laser product emitting CW beams of a single wavelength, which are well collimated or are assumed to be from a small source? If YES, the following procedure can be simplified and the following items do not need to be considered: 6.6(4.3 b), 6.7(4.3 c), 6.8(4.3 d) and 6.10(4.3 f) _____ _____	YES/NO/N.A.
6.4	For the purpose of classification, was the following ranking of classes (in increasing order of ocular hazard) used: Class 1, Class 1C, Class 1M, Class 2, Class 2M, Class 3R, Class 3B, and Class 4? Class 1C is considered not to be an ocular hazard (similar to Class 1) but may represent a skin hazard if used inappropriately and according to (5.3 b), shall meet requirements of any applicable vertical standards. For classification of a laser product as Class 1M or 2M, the use of an aperture specified as Condition 3 limits the amount of radiation that is collected by the pupil from large diameter beams. When measured under Condition 1, Class 1M and Class 2M products may have higher energy or power level than the AEL of Class 2 or Class 3R. For such laser products, a classification of 1M or 2M is appropriate. _____ _____	YES/NO/N.A.
6.5	For a single wavelength laser product, is the spectral range of the emission line narrow enough so that the AELs do not change? _____ _____ Please clarify how you determined the AELs in 6.5.1 and 6.5.2.	YES/NO/N.A.
6.5.1	If YES, this laser product is assigned to a class when the accessible laser radiation, measured under the conditions appropriate to that class, exceeds the AEL of all lower classes but does not exceed that of the class assigned. _____ _____	
6.5.2	If NO, this laser product is assigned to a class when the accessible laser radiation, measured under the conditions appropriate to that class, exceeds the AEL of all lower classes but does not exceed that of the class assigned for all wavelength ranges used to determine the applicable AEL. _____ _____	

6.6	For laser product emitting two or more wavelengths, are all wavelengths shown as additive in Table 1 of IEC 60825-1:2014? _____ _____	YES/NO/N.A.
6.6.1	If YES, is the sum of the ratios of the accessible laser radiation (measured under the conditions appropriate to that class) to the AELs of those wavelengths greater than unity for all lower classes but does not exceed unity for the class assigned? This rule applies also to non-laser radiation that is coincident on the retina for wavelengths between 400 nm and 1 400 nm or coincident on the aperture stop for other wave-length ranges. Therefore, the non-laser radiation shall be included for classification under IEC 60825-1:2014, 4.3 b) 1). In case of NO to this question, assign a higher laser class and repeat the evaluation. _____ _____	YES/NO/N.A.
6.6.2	If NO to 6.6, does the accessible laser radiation (measured under the conditions appropriate to that class) exceed the AELs for all lower classes but does not exceed the AEL for the class assigned for any wavelength? In NO in response to the question in 6.6.2, assign a higher laser class and repeat the evaluation. _____ _____	YES/NO/N.A.
6.7	For laser sources in the wavelength range from 400 nm to 1 400 nm, is the source subtending an angle of subtense greater than α_{min} and the simplified (default) evaluation method (5.4.2) is not used? If YES, complete the evaluation for extended sources according to (4.3 c). NOTE For a default condition in (5.4.2), the factor $C_6 = 1$ is assumed. _____ _____	YES/NO/N.A.
6.8	For non-uniform, non-circular or multiple apparent sources and for comparison with the retinal thermal limits, is the simplified method not used for the wavelength range from 400 nm to 1 400 nm and $\alpha > \alpha_{min}$? If YES, complete the evaluation according to (4.3 d). _____ _____	YES/NO/N.A.
6.9	Is every possible emission duration considered within the time base when determining the classification of a product? IF NO, refer to (4.3 e) For a multi wavelength emission laser product with simultaneous and spatially overlapping emission in the visible and in the non-visible part of the spectrum, where the emission is assessed as additive (see Table 1), and where the visible part on its own would be classified as Class 2 or 2M or 3R and the non-visible part on its own would be classified as Class 1 or Class 1M, the time base for the assessment of the non-visible emission may be 0,25 s. _____ _____	YES/NO/N.A.

6.10	Is the laser product emitting repetitive pulsed or modulated emissions? _____ _____	YES/NO/N.A.
6.10.1	IF Yes, verify compliance with 6.10.2 to 6.10.4.	
6.10.2	Does the accessible emission of any group of pulses (or sub-group of pulses in a train) delivered in any given time exceed the AEL for that time? NOTE See also 6.9 (4.3 e) for an applicable time base. _____ _____	YES/NO/N.A.
6.10.3	Does the accessible emission from any single pulse within a pulse train exceed the AEL for a single pulse of that duration (AEL_{single})? _____ _____	YES/NO/N.A.
6.10.4	Does the average power for a pulse train of emission duration T exceed the power corresponding to the AEL for a single pulse of duration T (AEL_T)? _____ _____	YES/NO/N.A.
6.10.5	For wavelength range from 400 nm to 1 400 nm, does the energy per pulse exceed the AEL for a single pulse multiplied by the correction factor C_5 ? NOTE 1 This requirement does not need to be assessed for comparison with photochemical limits nor for the determination of the AEL of Class 3B. NOTE 2 For more information about the repetitive pulsed and modulated emission, please refer to (4.3 f). _____ _____	YES/NO/N.A.

7 Labelling for laser radiation (7)

7.1 General (7.1)

7.1.1	Are all required labels durable, permanently affixed, or inscribed? NOTE Direct printing or engraving of equivalent labels on the laser product or panels is acceptable. _____ _____	<u>YES/NO/N.A.</u>
	If NO, – does the size or design of the product make labelling impractical? – are the labels included in the user information or the package? _____ _____	<u>YES/NO/N.A.</u>
7.1.2	Are labels legible and clearly visible during operation, maintenance or service, according to their purpose? _____ _____	<u>YES/NO/N.A.</u>
7.1.3	Are all required labels positioned so that they can be read without the necessity for human exposure to laser radiation in excess of the AEL for Class 1? _____ _____	<u>YES/NO/N.A.</u>
7.1.4	Are labels with black text, borders and symbols on a yellow background except for Class 1 where this colour combination need not be used? _____ _____	<u>YES/NO/N.A.</u>

7.2 Warnings for invisible and visible laser radiation (7.11 and 7.12)

7.2.1	For laser emissions that are only outside the visible range of 400 nm to 700 nm wavelength, are the words "laser radiation" replaced by "invisible laser radiation"? _____ _____	<u>YES/NO/N.A.</u>
7.2.2	For laser emissions that can be both inside and outside the visible range of 400 nm to 700 nm wavelengths, are the words "laser radiation" substituted by "visible and invisible laser radiation"? _____ _____	<u>YES/NO/N.A.</u>
7.2.3	For a product classified on the basis of the level of visible laser radiation and which also emits in excess of the AEL of Class 1 at invisible wavelengths, does the label include the words "visible and invisible laser radiation" in lieu of "Laser Radiation"? _____ _____	<u>YES/NO/N.A.</u>
7.2.5	If the alternative graphic labels in Figures 5 to 12 are used, are the warnings for visible and invisible radiation in an additional panel positioned below or to the side of the label? _____ _____	<u>YES/NO/N.A.</u>

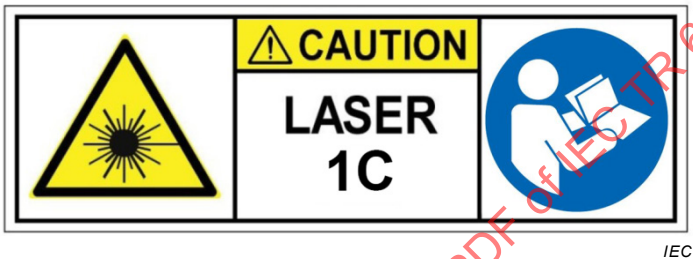
7.3 Class 1 laser products (7.2)

7.3.1	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (IEC 60825-1:2014, Figure 4) and affixed to the product or included in the information for the user? CLASS 1 LASER PRODUCT _____ _____	<u>YES</u> /NO/N.A.
7.3.2	Alternatively, is the label in Figure 5 affixed to the product? Figure 5 – Alternative label for Class 1 _____ _____	<u>YES</u> /NO/N.A.

7.4 Class 1M laser products (7.2)

7.4.1	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (IEC 60825-1:2014, Figure 4) and affixed to the product or included in the information for the user? LASER RADIATION DO NOT EXPOSE USERS OF TELESCOPIC OPTICS CLASS 1M LASER PRODUCTS _____ _____	<u>YES</u> /NO/N.A.
	Alternatively, is the label in Figure 6 affixed to the product? Figure 6 – Alternative label for Class 1M _____ _____	<u>YES</u> /NO/N.A.

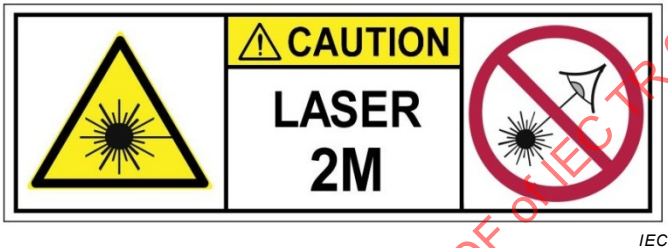
7.5 Class 1C laser products (7.3)

7.5.1	Is a warning label (<i>IEC 60825-1:2014, Figure 3</i>) affixed to the product? _____ _____	<u>YES/NO/N.A.</u>
7.5.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (<i>IEC 60825-1:2014, Figure 4</i>) and affixed to the product? LASER RADIATION FOLLOW INSTRUCTIONS CLASS 1C LASER PRODUCT _____ _____	<u>YES/NO/N.A.</u>
7.5.3	Alternatively, is the label in <i>Figure 7</i> affixed to the product?  Figure 7 – Alternative label for Class 1C _____ _____	<u>YES/NO/N.A.</u>

7.6 Class 2 laser products (7.4)

7.6.1	Is a warning label (IEC 60825-1:2014, Figure 3) affixed to the product?	<u>YES/NO/N.A.</u>
7.6.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (IEC 60825-1:2014, Figure 4) and affixed to the product? LASER RADIATION DO NOT STARE INTO BEAM CLASS 2 LASER PRODUCT _____ _____	<u>YES/NO/N.A.</u>
7.6.3	Alternatively, is the label in Figure 8 affixed to the product? Figure 8 – Alternative label for Class 2 _____ _____	<u>YES/NO/N.A.</u>

7.7 Class 2M products (7.4)

7.7.1	Is a warning label (<i>IEC 60825-1:2014, Figure 3</i>) affixed to the product? _____ _____	<u>YES/NO/N.A.</u>
7.7.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (<i>IEC 60825-1:2014, Figure 4</i>) and affixed to the product? LASER RADIATION DO NOT STARE OR EXPOSE USERS OF TELESCOPIC OPTICS CLASS 2M LASER PRODUCTS _____ _____	<u>YES/NO/N.A.</u>
7.7.3	Alternatively, is the label in <i>Figure 9</i> affixed to the product?  IEC Figure 9 – Alternative label for Class 2M NOTE Users are instructed by the above labelling not to stare into the beam, i.e. to perform active protective reactions by moving the head or closing the eyes and to avoid continued intentional intrabeam viewing. See also the detailed information in (<i>IEC 60825-1:2014, Annex C</i>). _____ _____	<u>YES/NO/N.A.</u>

7.8 Class 3R laser products (7.5)

7.8.1	Is a warning label (IEC 60825-1:2014, Figure 3) affixed to the product?	<u>YES/NO/N.A.</u>
7.8.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (IEC 60825-1:2014, Figure 4) and affixed to the product? LASER RADIATION AVOID DIRECT EYE EXPOSURE CLASS 3R LASER PRODUCT NOTE Labels using AVOID EXPOSURE TO BEAM in the second line are also acceptable. _____ _____	<u>YES/NO/N.A.</u>
7.8.3	Alternatively, is the label in Figure 10 affixed to the product? Figure 10 – Alternative label for Class 3R _____ _____	<u>YES/NO/N.A.</u>
7.8.4	An aperture warning label shall be affixed on Class 3R laser products close to each laser aperture through which laser radiation in excess of the AEL for Class 1 or Class 2 is emitted. The label should bear the words: LASER APERTURE or APERTURE FOR LASER RADIATION or AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE _____ _____	<u>YES/NO/N.A.</u>
7.8.5	For the aperture warning label, alternatively, the label in Figure 13 may be affixed close to the aperture: Figure 13 – Alternative label for laser aperture _____ _____	<u>YES/NO/N.A.</u>

7.9 Class 3B laser products (7.6)

7.9.1	Is a warning label (<i>IEC 60825-1:2014, Figure 3</i>) affixed to the product? _____ _____	<u>YES/NO/N.A.</u>
7.9.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (<i>IEC 60825-1:2014, Figure 4</i>) and affixed to the product? WARNING – LASER RADIATION AVOID EXPOSURE TO BEAM CLASS 3B LASER PRODUCT _____ _____	<u>YES/NO/N.A.</u>
7.9.3	Alternatively, is the label in <i>Figure 11</i> affixed to the product? IEC Figure 11 – Alternative label for Class 3B _____ _____	<u>YES/NO/N.A.</u>
7.9.4	An aperture warning label shall be affixed on Class 3B laser products close to each laser aperture through which laser radiation in excess of the AEL for Class 1 or Class 2 is emitted. The label should bear the words: LASER APERTURE or APERTURE FOR LASER RADIATION or AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE _____ _____	<u>YES/NO/N.A.</u>

7.9.5	For the aperture warning label, alternatively, the label in <i>Figure 13</i> may be affixed close to the aperture: IEC Figure 13 – Alternative label for laser aperture _____ _____	<u>YES/NO/N.A.</u>
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7.10 Class 4 laser products (7.7)

7.10.1	Is a warning label (<i>IEC 60825-1:2014, Figure 3</i>) affixed to the product? _____ _____	<u>YES/NO/N.A.</u>
7.10.2	Is the following text statement (or alternative wording that conveys the same meaning) included on an explanatory label (<i>IEC 60825-1:2014, Figure 4</i>) and affixed to the product? DANGER – LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED LASER RADIATION CLASS 4 LASER PRODUCT _____ _____	<u>YES/NO/N.A.</u>
7.10.3	Alternatively, is the label in <i>Figure 12</i> affixed to the product? IEC Figure 12 – Alternative label for Class 4 _____ _____	<u>YES/NO/N.A.</u>

7.10.4	An aperture warning label shall be affixed on Class 4 laser products close to each laser aperture through which laser radiation in excess of the AEL for Class 1 or Class 2 is emitted. The label should bear the words: LASER APERTURE or APERTURE FOR LASER RADIATION or AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE	<u>YES/NO/N.A.</u>
7.10.5	For the aperture warning label, alternatively, the label in <i>Figure 13</i> may be affixed close to the aperture:  IEC Figure 13 – Alternative label for laser aperture	<u>YES/NO/N.A.</u>

7.11 Radiation output and standards information (7.9)

7.11.1	Is the name and publication date of the standard, to which the laser product is classified, included in the explanatory label, or the alternative label, or elsewhere in close proximity on the product? _____	<u>YES</u> /NO/N.A.
	If NO, – is the laser product of class 1 or 1M? – is the name and publication date of the standard included in the user manual? _____	<u>YES</u> /NO/N.A.
7.11.2	Does the explanatory label (or alternative label) include statements of:	
	– the maximum output of laser radiation (see 3.58)? _____	<u>YES</u> /NO/N.A.
	– the pulse duration (if appropriate)? _____	<u>YES</u> /NO/N.A.
	– the emitted wavelength? _____	<u>YES</u> /NO/N.A.
	If, NO, is the laser product of Class 1? or if Class 1M, is the above mentioned information included in the user manual? _____	<u>YES</u> /NO/N.A.
	If the information in 7.11 is incorporated into the required labels above, it may be included within the panel with the laser class or in a separate panel below the laser class or within the descriptive wording below the laser class panel as appropriate for the size of the label.	

7.12 Warning for potential hazard to the skin or anterior parts of the eye (7.13)

7.12.1	Is a warning for potential hazard to the skin and anterior parts of the eye included: – on the product housing and – in the information for the user? _____ _____	YES/NO/N.A.
	IF NO, – is the laser product of Class 3B or 4? or – is the accessible emission <u>below</u> 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.
7.12.2	If YES, the following warning is given on product and in the information for the user: LASER ENERGY – EXPOSURE NEAR APERTURE MAY CAUSE BURNS Text border and symbols shall be black on a yellow background, including for Class 1. _____ _____	
	Is this warning provided:	
	– on the product housing; _____ _____	YES/NO/N.A.
	– in the information for the user? _____ _____	YES/NO/N.A.

8 Engineering specification (6)

8.1 Protective housing (6.2)

8.1.1	Does the laser product have a protective housing which, when in place, prevents human access to laser radiation (including errant laser radiation) in excess of the AEL for Class 1, except where human access is necessary for the performance of the function(s) of the product? (3.40 and 6.2.1)	YES/NO/N.A.
8.1.2	When the classification of a laser product is based on the prevention of human access to a level of energy that is equivalent to Class 4 (for instance, for laser processing machines), does the protective housing withstand exposures under reasonably foreseeable single fault conditions (see Clause 5), without human intervention? NOTE If the protective housing is of a size that permits human entry, see 8.11 (6.13).	YES/NO/N.A.
8.1.3	For Class 1, Class 1M, Class 2, Class 2M, or Class 3R laser products, does maintenance permit human access to levels of laser radiation of Class 3B or Class 4?	YES/NO/N.A.
8.1.4	For Class 3B laser products, does maintenance permit human access to levels of laser radiation of Class 4?	YES/NO/N.A.
8.1.5	Is a removable laser system contained within the protective housing and could it be operated by simply plugging into electrical mains or a battery? (6.2.3)	YES/NO
8.1.5.1	– If NO, then the requirements of IEC 60825-1 are not applicable to the removable laser system.	
8.1.5.2	If YES, the removable laser product shall comply with the requirements of Clauses 6 and 7 of IEC 60825-1:2014 applicable to its class and should additionally be inspected according to the appropriate questions in this checklist.	YES/NO/N.A.

8.2 Access panel and safety interlocks (6.2 and 6.3)

8.2.1	Are all non-interlocked panels (including those for embedded laser products) that are intended for removal or displacement for service and which would allow access to laser radiation in excess of the AEL assigned, secured in such a way that removal or displacement requires the use of tools? (6.2.2) _____ _____	<u>YES/NO/N.A.</u>
8.2.2	Is each non-interlocked panel or connection, which would allow access to laser radiation in excess of the AEL of Class 1 when removed or displaced, fitted with a label bearing the following words? (7.10.1) The labels described in 8.2.2 and 8.2.8 shall be subject to the same wording changes as described in 7.2 as appropriate for visible and/or invisible radiation. _____ _____	<u>YES/NO/N.A.</u>
	– For accessible radiation not exceeding the AEL for Class 1M where the level of radiation is measured according to (5.3 a) and (5.4): CAUTION – CLASS 1M LASER RADIATION WHEN OPEN DO NOT VIEW DIRECTLY WITH TELESCOPES The statement instead may be included in the information for the user. _____ _____	<u>YES/NO/N.A.</u>
	– For accessible radiation not exceeding the AEL for Class 2 where the level of radiation is measured according to (5.3 c) and (5.4): CAUTION – CLASS 2 LASER RADIATION WHEN OPEN DO NOT STARE INTO BEAM _____ _____	<u>YES/NO/N.A.</u>
	– For accessible radiation not exceeding the AEL for Class 2M where the level of radiation is measured according to (5.3 c) and (5.4): CAUTION – CLASS 2M LASER RADIATION WHEN OPEN DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH TELESCOPES _____ _____	<u>YES/NO/N.A.</u>
	– For accessible radiation not exceeding the AEL for Class 3R where the level of radiation is measured according to (5.3 d) and (5.4): CAUTION – CLASS 3R LASER RADIATION WHEN OPEN AVOID DIRECT EYE EXPOSURE NOTE Labels using AVOID EXPOSURE TO THE BEAM in the second line would also be acceptable. _____ _____	<u>YES/NO/N.A.</u>
	– For accessible radiation not exceeding the AEL for Class 3B where the level of radiation is measured according to (5.3 e) and (5.4): WARNING – CLASS 3B LASER RADIATION WHEN OPEN AVOID EXPOSURE TO THE BEAM _____ _____	<u>YES/NO/N.A.</u>

	– For accessible radiation exceeding the AEL for Class 3B where the level of radiation is measured according to (5.3 f) and (5.4): WARNING– CLASS 4 LASER RADIATION WHEN OPEN AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION _____ _____	YES/NO/N.A.																
8.2.3	Are all panels, which are intended for removal or displacement in order to gain access during maintenance or operation, interlocked to prevent human access to interior laser radiation as indicated in the table below? (6.3.1) <table border="1"> <thead> <tr> <th>Product class</th><th>Interlock required when accessible emission is of the following class or higher</th></tr> </thead> <tbody> <tr> <td>1, 1M, 1C</td><td>3R</td></tr> <tr> <td>2, 2M</td><td>3R</td></tr> <tr> <td>3R</td><td>3B</td></tr> <tr> <td>3B</td><td>3B</td></tr> <tr> <td>4</td><td>3B</td></tr> <tr> <td>_____</td><td>_____</td></tr> <tr> <td>_____</td><td>_____</td></tr> </tbody> </table>	Product class	Interlock required when accessible emission is of the following class or higher	1, 1M, 1C	3R	2, 2M	3R	3R	3B	3B	3B	4	3B	_____	_____	_____	_____	YES/NO/N.A.
Product class	Interlock required when accessible emission is of the following class or higher																	
1, 1M, 1C	3R																	
2, 2M	3R																	
3R	3B																	
3B	3B																	
4	3B																	
_____	_____																	
_____	_____																	
8.2.3.1	Are relevant panels interlocked? _____ _____	YES/NO/N.A.																
8.2.4	For Class 1, 1C, 1M, 2 or 2M laser products, does the removal of the panel result in emission through the opening not higher than the AEL for laser class 1M or class 2M as applicable according to the wavelength unless the interlock is defeated after opening of the panel? (6.3.1) _____ _____	YES/NO/N.A.																
	For Class 3R, 3B or 4 laser products, does the removal of the panel result in emission through the opening not higher than the AEL for laser class 3R as applicable according to the wavelength unless the interlock is defeated after opening of the panel? (6.3.1) Emission above the AEL of the product class that is intended during operation would cause the product classification to increase. Emission above the AEL of the product class that is intended during maintenance may impact the product classification (see 5.2.1). _____ _____	YES/NO/N.A.																
8.2.5	Where interlocked panels are removable, is the safety interlock of a design that prevents access to accessible emission levels above the applicable AEL of the class in Table 13 of IEC 60825-1 when the panel is removed? (6.3.1) _____ _____	YES/NO/N.A.																
8.2.6	Is inadvertent resetting of any interlock of a removable panel possible so that laser emission values are restored above the applicable AEL of the class in Table 13? (6.3.1) _____ _____	YES/NO/N.A.																

8.2.7	Do these interlocks conform to the requirements in the applicable IEC safety standard? (6.3.1, see also <i>Clause 1</i>) The requirements regarding foreseeable single fault of 5.1 (IEC 60825-1) also apply to interlocks, i.e. interlocks need to be failsafe or redundant. _____ _____	YES/NO/N.A.
8.2.8	If an interlock override system is provided (6.3.2): _____ _____	YES/NO/N.A.
	– Are safe working instructions provided? _____ _____	YES/NO/N.A.
	– Is it possible to leave the override system in operation when the access panel is returned to its normal position? An exception to this requirement is allowed if selection of a service "override" mode automatically isolates the laser beam and prevents automatic resumption of operation of the machine. This exception requires a lockable mode selector and requires a manual override to use the beam. _____ _____	YES/NO/N.A.
	– Is the interlock circuit so arranged (through lock relay contacts or other technology) such that, even in the override mode, if an open door is closed, it automatically returns normal interlock operation (eliminating potential "false safe" assumption about the panel or door)? _____ _____	YES/NO/N.A.
	– Is an interlock override warning visible or audible whenever the override is in operation and the laser is energized or its capacitor banks are not fully discharged, whether or not an interlocked panel is removed or displaced? _____ _____	YES/NO/N.A.
	– Are visible warnings clearly visible through protective eyewear specifically designed or specified for the wavelength(s) of the accessible laser radiation? _____ _____	YES/NO/N.A.
	– Is a warning label clearly associated with each interlocked opening which may be readily overridden? – Are such labels visible prior to and during interlock override and be in close proximity to the opening created by the removal of the protective housing? For the case of an embedded Class 1M laser, the statement instead may be included in the information for the user. _____ _____	YES/NO/N.A.
	For accessible radiation not exceeding the AEL for Class 1M where the level of radiation is measured according to (5.3 a) and (5.4): CAUTION – CLASS 1M LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED DO NOT VIEW DIRECTLY WITH TELESCOPES _____ _____	YES/NO/N.A.

	For accessible radiation not exceeding the AEL for Class 2 where the level of radiation is measured according to (5.3 c) and (5.4): CAUTION – CLASS 2 LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED DO NOT STARE INTO BEAM _____ _____	<u>YES/NO/N.A.</u>
	For accessible radiation not exceeding the AEL for Class 2M where the level of radiation is measured according to (5.3 c) and (5.4): CAUTION – CLASS 2M LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH TELESCOPES _____ _____	<u>YES/NO/N.A.</u>
	For accessible radiation not exceeding the AEL for Class 3R where the level of radiation is measured according to subclause (5.3 d) and (5.4): CAUTION – CLASS 3R LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID DIRECT EYE EXPOSURE NOTE 1 Labels using AVOID EXPOSURE TO THE BEAM in the third line would also be acceptable. _____ _____	<u>YES/NO/N.A.</u>
	For accessible radiation not exceeding the AEL for Class 3B where the level of radiation is measured according to (5.3 e) and (5.4): WARNING – CLASS 3B LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID BEAM EXPOSURE NOTE 2 Labels using AVOID EXPOSURE TO THE BEAM in the third line would also be acceptable. _____ _____	<u>YES/NO/N.A.</u>
	For accessible radiation exceeding the AEL for Class 3B where the level of radiation is measured according to (5.3 f) and (5.4): WARNING – CLASS 4 LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION _____ _____	<u>YES/NO/N.A.</u>

8.3 Remote interlock connector (6.4)

8.3.1	If the laser product is in one of the following classes: – Class 3B, except for handheld battery powered system, – Class 4 _____ _____	YES/NO/N.A.
	is a remote interlock connector provided? _____ _____	<u>YES</u> /NO/N.A.
	When the terminals are open circuited, will this prevent access to laser radiation in excess of the AEL for Class 1M or Class 2M according to the wavelength? Manufacturers may include a second interlock connector that does not require active action for starting emission, but it is not required for a product to have two connectors. _____ _____	<u>YES</u> /NO/N.A.

8.4 Manual reset (6.5)

8.4.1	If the laser product is Class 4: _____ _____	YES/NO/N.A.
	Does it incorporate a manual reset to enable resumption of accessible Class 4 laser radiation emission after interruption of emission caused by the use of the remote interlock connector or an interruption of longer than 5 s of electrical mains power? _____ _____	<u>YES</u> /NO/N.A.

8.5 Key Control (6.6)

8.5.1	If the laser product is in one of the following classes: – Class 3B – Class 4 _____ _____	YES/NO/N.A.
	is a key control provided? _____ _____	<u>YES</u> /NO/N.A.
8.5.2	If a key control is provided: _____ _____	
	is the key removable? _____ _____	<u>YES</u> /NO/N.A.
	is laser radiation accessible when the key is removed? _____ _____	YES/ <u>NO</u> /N.A.
	State the form that the key takes (e.g. conventional key, cipher combination, magnetic card, computer password, etc.): _____ _____	

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8.6 Laser radiation emission warning (6.7)

8.6.1	If the laser product is in one of the following classes: – Class 3R, in the wavelength range below 400 nm and/or above 700 nm – Class 3B – Class 4 _____ _____	YES/NO/N.A.
	Is an audible or visible signal given by a warning device when the laser system is switched on or if any capacitor banks of a pulsed laser are being charged or have not positively discharged? _____ _____	<u>YES</u> /NO/N.A.
	Is the warning device fail-safe or redundant? _____ _____	<u>YES</u> /NO/N.A.
	Are visible warning devices located so that viewing does not require exposure to laser radiation in excess of the AEL for Class 1M or Class 2M? _____ _____	<u>YES</u> /NO/N.A.
	Can operational controls be separated by 2 m or more from a radiation emission warning device? _____ _____	YES/NO/N.A.
	If YES, are the operational controls provided with audible to the person or visible warning devices in the vicinity of the operational control? _____ _____	<u>YES</u> /NO/N.A.
	Can the laser aperture be separated by 2 m or more from a radiation emission warning device? _____ _____	YES/NO/N.A.
	If YES, is the aperture provided with audible to the person or visible warning devices in the vicinity of the laser aperture? NOTE The emission indicator requirement can be satisfied on a handheld product where the aperture and controls are close together when it incorporates a normally off, momentarily on, switch that provides a clear tactile indication of emission. _____ _____	<u>YES</u> /NO/N.A.
	Where more than one output aperture is provided, does a visible warning device located at each aperture clearly indicate through which aperture(s) laser emission can occur? _____ _____	<u>YES</u> /NO/N.A.
	For a Class 3R handheld device, a momentary switch that needs to be continually depressed to allow emission may be used in lieu of the emission indicator.	<u>YES</u> /NO/N.A.

8.7 Beam stop or attenuator (6.8)

8.7.1	If the laser product is in one of the following classes: – Class 3B – Class 4 _____ _____	YES/NO/N.A.
	Is a permanently attached means of attenuation or termination of emission (e.g., beam stop, attenuator, electrical control or switch) provided? _____ _____	<u>YES</u> /NO/N.A.
	Is the beam stop or attenuator capable of preventing access to laser radiation in excess of the AEL for Class 1M or 2M? _____ _____	<u>YES</u> /NO/N.A.

8.8 Controls (6.9)

8.8.1	Are the controls for the laser product located so that adjustment and operation do not require exposure to laser radiation of Class 3R, Class 3B or 4? _____ _____	<u>YES</u> /NO/N.A.
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8.9 Viewing optics (6.10)

8.9.1	If viewing optics, viewport or display screens are provided, is attenuation of laser radiation sufficient to prevent human access in excess of the AEL for Class 1M? _____ _____	<u>YES</u> /NO/N.A.
8.9.2	If a shutter or variable attenuator is incorporated in the viewing optics, viewport or display screen: _____ _____	<u>YES</u> /NO/N.A.
	– Are means provided to prevent human access to laser radiation in excess of the AEL for Class 1M when the shutter is open or the attenuation is varied? _____ _____	<u>YES</u> /NO/N.A.
	– Is the shutter prevented from opening or is the attenuator prevented from variation when exposure to laser radiation is possible otherwise in excess of the AEL for Class 1M? _____ _____	<u>YES</u> /NO/N.A.

8.10 Scanning safeguard (6.11)

8.10.1	For a Class 1C laser product and for other than intended exposure of the target tissue, is human access prevented to laser radiation in excess of the AEL for: _____	YES/NO/N.A.
	a) Class 1 measured under Condition 3 and _____	<u>YES</u> /NO/N.A.
	b) Class 3B measured through a 3,5 mm aperture placed at 5 mm distance from the applicator with the applicator laterally? _____	<u>YES</u> /NO/N.A.
	Both measurements are performed for the duration of the emission following loss of contact. See IEC 61508 (all parts) for guidance on performance requirements and reliability for safeguards, although a full analysis may not be necessary. _____	<u>YES</u> /NO/N.A.

8.11 Scanning safeguard for Class 1C products (6.12)

8.11.1	For a Class 1C laser product and for other than intended exposure of the target tissue, is human access prevented to laser radiation in excess of the AEL for: _____	YES/NO/N.A.
	a) Class 1 measured under Condition 3, and _____	YES/ <u>NO</u> /N.A.
	b) Class 3B measured through a 3,5 mm aperture placed at 5 mm distance from the applicator with the applicator laterally? _____	YES/ <u>NO</u> /N.A.
	Both measurements are performed for the duration of the emission following loss of contact. See IEC 61508 for guidance on performance requirements and reliability for safeguards, although a full analysis may not be necessary. _____	

8.12 "Walk-in" access (6.13)

8.12.1	If the protective housing is equipped with access panels which provide "walk-in" access: _____	YES/NO/N.A.
	a) Are means provided so that any person inside the housing can prevent activation of a laser hazard that is equivalent to Class 3B or 4? _____	<u>YES</u> /NO/N.A.
	b) Is an emission warning device situated so as to provide adequate warning of emission of laser radiation equivalent to Class 3R in the wavelength range below 400 nm or above 700 nm, or of laser radiation equivalent to Class 3B or 4 to any person who might be within the housing? Human access to Class 3R laser radiation may not be permitted in some countries during the "walk-in". _____	<u>YES</u> /NO/N.A.
	c) Where "walk-in" access during operation is intended or reasonably foreseeable, is emission of laser radiation equivalent to Class 3B or Class 4 while someone is present inside the enclosure of a Class 1, Class 2, or Class 3R product prevented by engineering means? NOTE Methods to prevent human access to radiation when persons are inside the protective housing may include pressure sensitive floor mats, infrared detectors, etc. _____	<u>YES</u> /NO/N.A.

8.13 Environmental considerations (6.14)

8.13.1	Does the laser product meet the safety requirements defined in IEC 60825-1 under all expected operating conditions appropriate for the intended use of the product, including: _____	<u>YES</u> /NO/N.A.
	– Climatic conditions (e.g. temperature, relative humidity)? _____	<u>YES</u> /NO/N.A.
	– Vibration and shock? _____	<u>YES</u> /NO/N.A.
	If no provisions are made in the specific product safety standard, are the relevant subclauses of IEC 61010-1 considered? NOTE Requirements related to electromagnetic compatibility are under consideration. _____	YES/NO/N.A.