IEC TS 60825-19

Edition 1.0 2024-03

TECHNICAL SPECIFICATION

colour inside

Safety of laser products –
Part 19: Moving platform laser products



IEC TS 60825-19:2024-03(en)

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC TS 60825-19

Edition 1.0 2024-03

TECHNICAL SPECIFICATION

colour inside

Safety of laser products –
Part 19: Moving platform laser products

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.260

ISBN 978-2-8322-8346-2

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 6
2 Normative references 6
3 Terms, definitions, symbols and abbreviated terms 6
4 Classification principles 8
5 Determination of the accessible emission level and product classification 8
5.1 General 8
5.2 Evaluation of moving platform laser products 8
6 Engineering specifications 10
7 Labelling and user information 10
Annex A (informative) Flowcharts and examples for the classification of moving platform laser products 11
Bibliography 15

Figure 1 – Example in side view and top view of a swept volume, filled in blue, where human access can be excluded (VCPHA is represented by dashed red line) for a moving platform laser product moving at velocity $\vec{v}$ 9
Figure A.1 – Schematic flow chart of the classification of moving platform laser products 11
Figure A.2 – Calculation of the VCPHA for a moving platform laser product according to 5.2 for a specific averaged velocity $\vec{v}$ over the time period t_{move} 12
Figure A.3 – Example of a moving platform laser product emitting in direction of movement with a reference point at the emitting chip or the vertex of the fan angle according to IEC 60825-1:2014, Table 11 and emitting visible or near infrared radiation resulting in a minimum measurement distance of 100 mm according to IEC 60825-1:2014, Table 10 13
Figure A.4 – Example of a moving platform laser product emitting perpendicular to the direction of movement with a reference point at the emitting chip or the vertex of the fan angle according to IEC 60825-1:2014, Table 11 and emitting visible or near-infrared radiation resulting in a minimum measurement distance of 100 mm according to IEC 60825-1:2014, Table 10 13
Figure A.5 – Position of the stationary and the moving aperture over time when evaluating neighbouring platforms 14
Figure A.6 – Example of a moving platform laser product 14

Table 1 – Values for the parameters t_{move} and δ_{max} 8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

SAFETY OF LASER PRODUCTS –

Part 19: Moving platform laser products

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC TS 60825-19 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment. It is a Technical Specification.

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

Draft	Report on voting
76/746/DTS	76/749/RVDTS

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 Specification 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/publications.

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, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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

Laser products are sometimes used on moving platforms. Currently the standard IEC 60825-1:2014 considers only a stationary aperture; it does not address the situations where the emitting aperture is mounted on a platform, such as a vehicle, that can be in motion. Failure to consider the effects of the motion of the platform can result in overly restrictive assessment of the hazard.

Although accounting for a platform’s movement during the assessment of a laser product’s classification can lead to less restrictive measurement conditions, it is important not to overlook that there can be apertures, even on other moving platforms, moving at a relative speed of zero or close to zero with respect to the moving platform laser product being classified.

SAFETY OF LASER PRODUCTS –

Part 19: Moving platform laser products

1 Scope

This part of IEC 60825 specifies the velocity-dependent closest points of human access (VCPHA) for the classification of moving platform laser products when considering the movement of the platform with respect to a stationary frame of reference. This presupposes that the inherent kinetic hazard of the moving platform creates a zone in which persons would not be reasonably expected to be located. Additionally, it takes neighbouring moving platforms into account by defining stationary and moving apertures.

This document is applicable to all laser products whose laser apertures are on a moving platform.

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, definitions, symbols and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60825-1:2014 and the following 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

3.1
moving platform laser product
product which is designed to move and incorporates an aperture that can emit laser radiation

Note 1 to entry: This definition is different from the definition of a *scanning laser product* (3.3) where the aperture stop is stationary for the determination of the accessible emission.

Note 2 to entry: A moving platform laser product can use scanning laser radiation.

Note 3 to entry: A moving platform can be so small that there is no place for a person to be in or on the moving platform. Alternately, a moving platform can be sufficiently large to allow one or more persons to be in or on the moving platform.

Note 4 to entry: Examples of moving platforms are vehicles, aircrafts, boats and trains.

3.2
moving platform laser product velocity
$\vec{v}$
velocity vector, composed of speed and direction, averaged over the time period t_{move}

Note 1 to entry: $|\vec{v}|$ is expressed in metres per second.

3.3
scanning laser product
laser product where the accessible emission has a time-varying direction or pattern of propagation with respect to a stationary frame of reference

Note 1 to entry: This definition is changed compared to the definition of scanning laser radiation in IEC 60825-1:2014, 3.78 because a time-varying origin is a characteristic of a moving platform laser product (see 3.2) and not of a scanning laser product.

Note 2 to entry: For the determination of the accessible emission of scanning laser radiation, a stationary aperture stop is used.

3.4
closest point of human access
CPHA
closest position where a human body can be exposed to laser radiation emitted from the laser product that is ensured by mechanical design

Note 1 to entry: The minimum measurement distances as given in IEC 60825-1:2014, Table 10 are determined from the measurement reference point (IEC 60825-1:2014, Table 11), but IEC 60825-1:2014 does not permit measurements closer than the CPHA.

3.5
velocity-dependent closest point of human access
VCPHA
closest position of human access to a moving platform laser product's laser emission that is defined by the motion of the moving platform laser product

Note 1 to entry: The term closest point of human access is also used in IEC 60825-1. This document defines a velocity-dependent CPHA due to the movement of a laser device. In the case of a velocity $\vec{v}$ = 0, this VCPHA corresponds to the closest point of human access in IEC 60825-1.

3.6
t_{move}
time for VCPHA
time used to calculate the distance δ

Note 1 to entry: t_{move} is expressed in seconds.

3.7
δ
distance for VCPHA
distance used to determine the VCPHA for a moving platform laser product, where $\delta = t_{move} \cdot |\vec{v}|$

Note 1 to entry: δ is expressed in metres.

3.8
δ_{max}
maximum distance for VCPHA
maximum value of δ above which the VCPHA for a moving platform laser product is independent of velocity

Note 1 to entry: δ_{max} is expressed in metres.