IEC TS 60825-20

Edition 1.0 2025-09

TECHNICAL SPECIFICATION

Safety of laser products -
Part 20: Safety requirements for products intentionally exposing face or eyes to laser radiation

ICS 13.110; 31.260

ISBN 978-2-8327-0718-0

IEC TS 60825-20:2025-09(en)

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 It also gives information on projects, replaced and withdrawn publications.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.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Safety of laser products - Part 20: Safety requirements for products intentionally exposing face or eyes to laser radiation

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 60825-20 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment. It is a Technical Specification.

This Technical Specification is to be used in conjunction with IEC 60825-1:2014.

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

Draft	Report on voting
76/766/DTS	76/776/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.

A list of all parts in the IEC 60825 series, published under the general title *Safety for laser products*, can be found on the IEC website.

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.

INTRODUCTION

There is an emerging set of consumer Class 1 laser devices that intentionally directs laser radiation towards a person's eyes, or face, or both to perform a useful function (example: facial or retina or iris recognition, glasses and headsets for augmented reality (AR), virtual reality (VR) and mixed reality (MR), etc.). The nature of these devices is such that in the event of a fault or misuse resulting in excessive emissions, the likelihood of ocular injury can be greater during operation when compared to a device not intended for direct exposure.

This document provides risk-based requirements in the form of a safety-focused failure mode and effects analysis (FMEA) defined in Clause 6 for products that intentionally direct laser radiation towards the user's eyes or face, or both. The purpose of a risk analysis for such laser products is to reduce the risk of potential injury to the eyes or to the face during fault conditions which could occur at any time over the expected useful lifetime of the product.

1 Scope

This document provides radiation safety requirements (normative) and guidelines (informative) for the consideration of faults for Class 1 laser devices with laser radiation directed towards the eyes or face. Requirements for the safety of the nominal emission are not in the scope of this document.

Examples:

– devices with laser light facial or ocular recognition;
– virtual reality headsets or glasses;
– devices with gesture tracking via eye or facial movements;
– driver surveillance cameras;
– full body scanners (including eyes, face, and body).

Products exempted from this document include:

– medical and ophthalmic devices;
– automotive (lidars), lamps;
– laser applications where the laser is used in a professional (non-consumer) setting and is intended for direct or long-time exposure of the eyes or face.

This document provides normative requirements and informative guidelines for:

– radiation safety analysis;
– production-line testing;
– hazard analysis for laser radiation emissions (using a modified safety-focused FMEA approach)

  NOTE all subsequent references to FMEA in this document refers to this safety-focused FMEA approach.

– examples of typical failure modes and mitigation techniques

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*

ISO/IEC Guide 51:2014, *Safety aspects - Guidelines for their inclusion in standards*