

INTERNATIONAL STANDARD



**Photobiological safety of lamps and lamp systems –
Part 5: Image projectors**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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Photobiological safety of lamps and lamp systems – Part 5: Image projectors

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International Standard IEC 62471-5 has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

The text of this standard is based on the following documents:

FDIS	Report on voting
76/519/FDIS	76/521/RVD

Full information on the voting for the approval of this standard 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 2.

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INTRODUCTION

Most lamps and lamp systems are safe and do not pose photobiological risks except under unusual exposure conditions. This also is the case for optical image projectors where experience shows that even high power cinema projectors may be safe for accidental momentary viewing and can only under some conditions pose optical hazards at close distances or for intentional 'long-duration' staring into the source. The rapid development of solid-state and other lamps or lamp systems has permitted new projector products, and generated the need for a photobiological safety standard for this group of lamp systems.

Optical radiation hazards from all types of lamps and lamp systems are currently assessed by the application of IEC 62471:2006 (CIE S 009:2002), *Photobiological safety of lamps and lamp systems*. IEC 62471 covers LEDs, incandescent, low- and high-pressure gas-discharge, arc and other lamps. Following the concept of vertical standards, the risk group classification system in IEC 62471 for lamps is to be adapted for specific product groups such as image projectors.

This part of IEC 62471 provides a risk group classification system for image projectors, and measurement conditions for optical radiation emitted by image projectors. It includes manufacturing requirements that may be required as a result of an image projector system being assigned to a particular risk group. Therefore, this part of IEC 62471 provides safety requirements for lamp systems that are intended to produce projected visible optical radiation, such as theatre projectors, data projectors and home-use projectors. The assigned risk group of a projector product also may be used by projector manufacturers to assist with any risk assessments, e.g. for occupational exposure in workplaces. National requirements may exist for the assessment of products or occupational exposure.

The emission limits provided in this part of IEC 62471 are derived from the exposure limits specified by ICNIRP in their 2013 Guidelines for incoherent visible and infrared radiation [1]¹. These exposure limits are also the basis for the emission limits to be specified in the future International Standard IEC 62471-12.

¹ Numbers in square brackets refer to the Bibliography.

² Revision of IEC 62471:2006.

PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS –

Part 5: Image projectors

1 Scope

This part of IEC 62471 provides requirements regarding photobiological safety of the optical radiation emitted by image projectors. This part of IEC 62471 does not deal with other hazards such as electrical, mechanical or fire hazards.

This part of IEC 62471 provides requirements regarding:

- optical radiation safety assessment of image projectors;
- projector risk groups;
- testing conditions and measurement conditions;
- manufacturer's requirements including user information.

The scope of this part of IEC 62471 is photobiological safety of image projectors including the emissions from laser-illuminated projectors that fulfill the requirements as specified in IEC 60825-1:2014, 4.4 and for which visible light emission has been excluded from classification in IEC 60825-1.

This part of IEC 62471 does not address safety requirements for laser display products where collimated laser beams — generally scanned — are employed. It does address those laser-illuminated projectors that employ a laser source to illuminate, for example, a micro-electro-mechanical system (MEMS) without scanned beams or crystal-based display projector system.

NOTE Image projectors containing lasers are subject to those provisions of IEC 60825-1 applicable to the embedded laser. See IEC 60825-1:2014, 4.4 for which visible light emission has been excluded from the laser product classification.

This part of IEC 62471 includes projectors for only visible image projection and does not include ultraviolet (UV) projectors, infrared (IR) projectors, general lighting service (GLS) lamps (GLS; defined in IEC 62471) or projector lamp systems used for general lighting, which are treated in separate International Standards.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62471, *Photobiological safety of lamps and lamp systems*

IEC 60825-1:2014, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 60065, *Audio, video and similar electronic apparatus – Safety requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62471, IEC 60050-845 [2] and the following apply.

3.1

accessible emission

AE

level of radiation determined at a certain distance from the product and with measurement conditions described in Clause 5

Note 1 to entry: The accessible emission is compared with the AEL (see 3.2) to determine the risk group of the product.

3.2

accessible emission limit

AEL

maximum accessible emission permitted within a particular risk group

3.3

angle of acceptance

γ

plane angle within which a detector will respond to optical radiation

Note 1 to entry: The angle of acceptance is usually measured in radians (SI unit).

Note 2 to entry: This angle of acceptance may be controlled by apertures or optical elements in front of the detector. The angle of acceptance is also sometimes referred to as the field of view (see 3.12).

Note 3 to entry: The angle of acceptance should not be confused with the angular subtense of the source (see 3.4) or the beam divergence.

3.4

angular subtense

α

visual angle subtended by the apparent source at the eye of an observer or at the point of measurement

Note 1 to entry: In this part of IEC 62471, subtended angles are denoted by the full included angle, not the half angle.

Note 2 to entry: SI unit: radian.

Note 3 to entry: The angular subtense α may be modified by incorporation of lenses and mirrors as projector optics, i.e. the angular subtense of the apparent source may differ from the angular subtense of the physical source.

Note 4 to entry: The limitations of α in this part of IEC 62471 are:

For continuous wave: $\alpha_{\max} = 0,1 \text{ rad}$, $\alpha_{\min} = 0,001 \text{ 5 rad}$.

For pulsed emission: α_{\max} is described in Table 7, $\alpha_{\min} = 0,001 \text{ 5 rad}$.

3.5

cinema-use projector

image projector used for projection in theatrical environment

3.6

consumer product

item intended for consumers or likely to be used by consumers, even if not intended for them