Photobiological safety of lamps and lamp systems - Part 7: Light sources and luminaires primarily emitting visible radiation (IEC 62471-7:2023)

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NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62471-7:2023 sisaldab Euroopa standardi EN IEC 62471-7:2023 ja selle paranduste AC:2023 ja AC:2024 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62471-7:2023 consists of the English text of the European standard EN IEC 62471-7:2023 and its corrigendae AC:2023 and AC:2024.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 24.03.2023.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. Date of Availability of the European standard is 24.03.2023.
Parandusega AC:2023 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega ⟦AC1⟩ ⟨AC1⟧. Parandusega AC:2024 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega ⟦AC2⟩ ⟨AC2⟧. Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The start and finish of text introduced or altered by corrigendum AC:2023 is indicated in the text by tags ⟦AC1⟩ ⟨AC1⟧. The start and finish of text introduced or altered by corrigendum AC:2024 is indicated in the text by tags ⟦AC2⟩ ⟨AC2⟧. The standard is available from the Estonian Centre for Standardisation and Accreditation.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62471-7

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English Version

Photobiological safety of lamps and lamp systems - Part 7: Light sources and luminaires primarily emitting visible radiation (IEC 62471-7:2023)

Sécurité photobiologique des lampes et des appareils utilisant des lampes - Partie 7: Sources de lumière et luminaires qui émettent principalement un rayonnement visible
(IEC 62471-7:2023)

Photobiologische Sicherheit von Lampen und Lampensystemen - Teil 7: Lichtquellen und Leuchten, die hauptsächlich sichtbare Strahlung aussenden
(IEC 62471-7:2023)

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Comité Européen de Normalisation Electrotechnique
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Ref. No. EN IEC 62471-7:2023 E

European foreword

The text of document 34/1004/FDIS, future edition 1 of IEC 62471-7, prepared by IEC/TC 34 "Lighting" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62471-7:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-12-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-03-23

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The text of the International Standard IEC 62471-7:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60432-1:1999	NOTE	Approved as EN 60432-1:2000 (modified)
IEC 60432-1:1999/A1:2005	NOTE	Approved as EN 60432-1:2000/A1:2005 (not modified)
IEC 60432-1:1999/A2:2011	NOTE	Approved as EN 60432-1:2000/A2:2012 (not modified)
IEC 60432-2:1999	NOTE	Approved as EN 60432-2:2000 (modified)
IEC 60432-2:1999/A1:2005	NOTE	Approved as EN 60432-2:2000/A1:2005 (modified)
IEC 60432-2:1999/A2:2012	NOTE	Approved as EN 60432-2:2000/A2:2012 (not modified)
IEC 60432-3:2012	NOTE	Approved as EN 60432-3:2013 (not modified)
IEC 60598 (series)	NOTE	Approved as EN 60598 (series)
IEC 60598-2-13:2006	NOTE	Approved as EN 60598-2-13:2006 (not modified) + A11:2021
IEC 60598-2-13:2006/A1:2011	NOTE	Approved as EN 60598-2-13:2006/A1:2012 (not modified)
IEC 60598-2-13:2006/A2:2016	NOTE	Approved as EN 60598-2-13:2006/A2:2016 (not modified)
IEC 60825-1:2014	NOTE	Approved as EN 60825-1:2014 (not modified) + A11:2021
IEC 62031:2018	NOTE	Approved as EN IEC 62031:2020 (not modified) + A11:2021
IEC 62035:2014	NOTE	Approved as EN 62035:2014 (modified)
IEC 62035:2014/A1:2016	NOTE	Approved as EN 62035:2014/A1:2019 (not modified)

IEC 62471-7

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Photobiological safety of lamps and lamp systems – Part 7: Light sources and luminaires primarily emitting visible radiation

Sécurité photobiologique des lampes et des appareils utilisant des lampes – Partie 7: Sources de lumière et luminaires qui émettent principalement un rayonnement visible

IEC 62471-7:2023-02(en-fr)

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INTERNATIONAL STANDARD

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Sécurité photobiologique des lampes et des appareils utilisant des lampes – Partie 7: Sources de lumière et luminaires qui émettent principalement un rayonnement visible

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS –

Part 7: Light sources and luminaires primarily emitting visible radiation

FOREWORD

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

Draft	Report on voting
34/1004/FDIS	34/1011/RVD

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 International Standard 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.

A list of all parts in the IEC 62471 series, published under the general title *Photobiological safety of lamps and lamp systems*, 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 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
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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.

The contents of the corrigenda 1 (2023-06) and 2 (2024-09) have been included in this copy.

INTRODUCTION

The wording "lamps and lamp systems" is used in the title of the IEC 62471 series. However, in the title of this Part 7, the wording "light sources and luminaires" is used. The reason for this is that due to the introduction of new LED technologies the characteristics of the light-generating components have changed. Therefore, the terms "electrical light source" and "luminaire" are nowadays used in TC 34 instead of "lamp" and "lamp system".

"Electric light source" is the generic term for products which produce light; the term "lamp" (light source with a lamp cap-holder system) is thereby included.

"Luminaire" is the basic term (see IEC 60050-845:2020, 845-30-001) for a product that includes all necessary accessories and describes a device that distributes, filters, or transforms the light produced from at least one source of optical radiation and which includes, except the sources themselves, all the parts necessary for fixing and protecting the sources and, where necessary, circuit auxiliaries together with the means for connecting them to the power supply.

▌AC1⟩ When luminaires are designed and constructed in accordance with the requirements of this document, they are presumed to function safely under normal use and present no photobiological hazard. Conformity of luminaires can be verified by application of the assessment procedures described in this document. ⟨AC1▐

The light sources can be interchangeable or an integral part of the luminaire. If the light source is an integral part of the luminaire, the luminaire can also be considered a light source system (corresponding to a lamp system).

Most electrical light sources and luminaires within the scope of this document will not present a photobiological hazard due to their spectra, their light distribution, the light levels, and the natural aversion responses – people do not usually stare into bright sources, for example. There remain, however, some light sources and luminaires, which have the potential to pose adverse health effects from the emitted optical radiation. Exposure limits for a range of photobiological hazards associated with broad-band optical radiation sources have been developed and published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

This document introduces a new assessment procedure to address the various lighting applications in which the intended purpose is the illumination of objects and scenes and in signalling applications. This new approach uses revised time bases (and emission limits) related to the intentional or unintentional direct viewing of the luminaire and assessment distances depending on application. These emission limits are based on the exposure limits of the ICNIRP.

In this document, a complete procedure is used to cover all photobiological hazards in the range of 200 nm to 3 000 nm as implemented in IEC 62471.

This procedure, based on a product- and application-related assessment, leads to a pass/fail result for a specific product in that given application.

PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS –

Part 7: Light sources and luminaires primarily emitting visible radiation

1 Scope

This part of IEC 62471 specifies an assessment of the photobiological safety of electrical light sources and luminaires in normal use as well as some basic product requirements. It applies to electrical light sources and luminaires that emit radiation predominantly in the visible spectral range (380 nm to 780 nm) and are used to illuminate spaces or objects or used for signalling.

Electrical light sources and luminaires designed for emitting radiation in the visible range can also emit radiation in the ultraviolet (UV) and infrared (IR) regions depending on the technology applied. This document, therefore, includes the blue light, thermal, UV, UV-A, IR and skin thermal hazards for the optical radiation over the wavelength range 200 nm to 3 000 nm.

Electrical light sources and luminaires that are designed to predominantly emit radiation outside the visible spectral range (380 nm to 780 nm) (e.g. UV sterilizers or industrial heaters) are not within the scope of this document.

Electrical light sources for illumination are considered to emit continuous light for photobiological safety assessment. This includes light sources with pulse width modulation (PWM).

This document can also be applied to the illumination function of multi-function luminaires which can simultaneously perform functions other than illumination. Other standards can be applied to the non-illumination function(s).

This document can also be applied to electric light sources and luminaires which emit visible light, when there is no limitation on the presence of people (e.g. horticulture).

This document can also be applied to laser products used for illumination and signalling when the conditions of IEC 60825-1:2014, 4.4 are met.

NOTE See IEC 60825-1:2014 for other requirements of laser products.

This document is intended to be referenced by product standards for the assessment of applicable photobiological safety aspects. Additional details for the photobiological safety assessment and data presentation are specified in the product standards.

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 60050-845, *International Electrotechnical Vocabulary (IEV) – Part 845: Lighting,* available at http://www.electropedia.org

IEC 60598-1:2020, *Luminaires – Part 1: General requirements and tests*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

IEC 62471-5:2015, *Photobiological safety of lamps and lamp systems – Part 5: Image projectors*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
blue light hazard
BLH
potential for a photochemically induced retinal injury (photic maculopathy) resulting from optical radiation exposure at wavelengths primarily between 400 nm and 500 nm

Note 1 to entry: This damage mechanism dominates over the thermal damage mechanism for exposure durations exceeding 10 s.

Note 2 to entry: The weighting function extends into the UV-A for persons without a normal UV-A absorbing lens.

[SOURCE: IEC 60050-845:2020, 845-26-055, modified – In Note 2 to entry "action spectrum" has been replaced with "weighting function".]

3.2
exposure limit
maximum level of exposure of a surface, usually the eye or skin, that is not expected to result in adverse biological effects

Note 1 to entry: Exposure limits for human safety of optical radiation, H_L, are normally recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Note 2 to entry: Exposure limits are often based on irradiance (e.g. for the skin), but where relevant, can also be based on radiance (e.g. the blue light hazard of extended sources).

[SOURCE: IEC 60050-845:2020, 845-26-072]

3.3
emission limit
specified maximum emission level of a source of optical radiation that is not expected to result in adverse biological effect for a specific application

Note 1 to entry: Evaluation of sources to the emission limits can be based upon reasonably foreseeable conditions of time-weighted exposure. It incorporates both the concept of exposure duration and exposure distance and is derived from exposure limits.

[SOURCE: IEC 60050-161:1990, 161-03-12, modified – The domain has been deleted, the definition has been adapted in relation to optical radiation and the Note to entry has been added.]