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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



34/885/CD

COMMITTEE DRAFT (CD)

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IEC TC 34 : LIGHTING	
SECRETARIAT: United Kingdom	SECRETARY: Mr Petar Luzajic
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 76	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS –

PART 7: LIGHT SOURCES AND LUMINAIRES PRIMARILY EMITTING
VISIBLE RADIATION

FOREWORD

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IEC 62471-7 has been prepared by committee TC 34: Lighting. It is an International Standard.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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

99 at https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC
100 are described in greater detail at <https://www.iec.ch/standardsdev/publications>.

101 The committee has decided that the contents of this document will remain unchanged until the
102 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
103 specific document. At this date, the document will be

- 104 • reconfirmed,
- 105 • withdrawn,
- 106 • replaced by a revised edition, or
- 107 • amended.

108

INTRODUCTION

109 The title of the IEC 62471 series is "Photobiological safety of lamps and lamp systems", in
110 addition this Part 7 has "Light sources and luminaires primarily emitting visible radiation" as a
111 supplementary title. The reason for this is that due to the introduction of new technologies (LED-
112 Technologies) the characteristics of the light-generating components have changed. Therefore,
113 the terms electrical light sources and luminaires are nowadays used in TC 34 instead of lamps
114 and lamp systems. Light source is the generic term for products which are producing light; lamp
115 (light source with a lampholder system) is thereby included.

116 Luminaire is the basic term for a product that includes all necessary accessories and describes
117 a device that distributes, filters, or transforms the light produced by one or more light sources
118 and that includes all parts necessary to support, fix and protect the light sources, but not the
119 light sources themselves and, if necessary, circuit accessories including connection devices for
120 connection to the supply mains.

121 When luminaires are designed and constructed in accordance with the requirements of this
122 document, they are presumed to function safely under normal use and not to present a hazard
123 to persons or the environment. Conformity of luminaires is verified by performing the evaluation
124 of this document with the specified acceptable light sources (one or more).

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

128 This creates two evaluation paths.

129 For luminaires with replaceable light sources, an evaluation can be made for the light source
130 and the results can be transferred to luminaires according to the specifications of this document.

131 For luminaires with integrated light sources, the luminaire is to be evaluated as a complete unit.

132 The terms light sources and luminaires are used in this part 7, the other parts of IEC 62471 are
133 using the terms lamp and lamp systems.

134 Most electrical light sources and luminaires within scope of this document will not present a
135 photobiological hazard due to the spectra used, the light levels, and the natural aversion
136 responses – people do not usually stare into high luminance sources, for example. Normally
137 light sources and luminaires are safe and do not pose photobiological hazards except under
138 unusual exposure conditions. There remain, however, some light sources and luminaires, which
139 have the potential to pose adverse health effects from the emitted optical radiation. Maximum
140 exposure limits for a range of photobiological hazards associated with broad-band optical
141 radiation sources have been developed and published by the International Commission on Non-
142 Ionizing Radiation Protection (ICNIRP).

143 This new part 7 used a new assessment procedure to address the various lighting applications
144 in which the intended purpose is the illumination of objects and scenes. This new approach
145 uses revised time bases related to the intentional or unintentional view into the luminaire
146 (leading to emission limits) and assessment distances depending on application. These
147 emission limits are based on the exposure limits of ICNIRP.

148 With this part 7, a complete procedure is used to cover all photobiological hazards in the range
149 of 200 nm to 3 000 nm as implemented in IEC 62471.

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

152

PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS – PART 7: LIGHT SOURCES AND LUMINAIRES PRIMARILY EMITTING VISIBLE RADIATION

1 Scope

This Part 7 of IEC 62471 series specifies an application-related assessment of the photobiological safety of electrical light sources and luminaires in normal use and sets application-specific emission limits based on the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines for exposure limit values. The assessment is applied for 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.

As electrical light sources and luminaires predominantly emitting radiation in the visible range may also emit radiation in the ultraviolet (UV) and infrared (IR) regions, the photobiological safety assessment within this document includes the blue light-, thermal-, UV-, UV-A-, IR- and skin thermal- hazards (includes 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 (PWM = pulse width modulation are included), therefore emission levels of continuous light (CW = continuous wave) are applied.

This document also applies to electrical light sources and luminaires which are emitting visible light, but the main purpose is not illumination or signalling (e.g., horticulture) when there is no limitation on people presence.

Multi-function luminaires which are subjected simultaneously to different functions other than illumination and for which other standards apply shall comply with the provisions of this document for their illumination function.

This document also applies to laser products when the conditions of IEC 60825-1:2014, 4.4 are met and they are used for illumination or signalling. Such laser products shall have a classification according to IEC 60825-1:2014, except for the optical radiation used for illumination. This optical radiation is evaluated according to this document.

This document is intended as a reference for TC 34 product standards.

If separate standards outside the scope of TC 34 exist for assessment of the photobiological safety of specific products or product groups, these standards may be more appropriate.

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.

- 197 CIE S 017/E:2020, *ILV: International Lighting Vocabulary*
- 198 IEC 60432-1:1999+AMD1:2005+AMD2:2011, *Incandescent lamps - Safety specifications - Part*
199 *1: Tungsten filament lamps for domestic and similar general lighting purposes*
- 200 IEC 60432-2:1999+AMD1:2005+AMD2:2012 CSV, *Incandescent lamps - Safety specifications*
201 *- Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes*
- 202 IEC 60432-3:2012, *Incandescent lamps - Safety specifications - Part 3: Tungsten halogen*
203 *lamps (non-vehicle)*
- 204 IEC 62035:2014/AMD1:2016, *Discharge lamps (excluding fluorescent lamps) - Safety*
205 *specifications*
- 206 IEC 60050 (all parts), *International Electrotechnical Vocabulary (available at*
207 *<<http://www.electropedia.org/>>)*
- 208 IEC 60598-1, *Luminaires — Part 1: General requirements and tests*
- 209 IEC 60825-1:2014, *Safety of laser products — Equipment classification and requirements*
- 210 IEC 62031:2018, *LED modules for general lighting - Safety specifications*
- 211 IEC 62471:2006, *Photobiological safety of lamps and lamp systems*
- 212 IEC 62471-5:2015, *Photobiological safety of lamps and lamp systems - Part 5: Image projectors*
- 213 IEC 62504, *General lighting — Light emitting diode (LED) products and related equipment —*
214 *Terms and definitions*

215 **3 Terms and definitions**

216 For the purposes of this document, the terms and definitions given in IEC 62471:2006,
217 IEC 62504 and CIE S 017/E:2020 apply with the following additions.

218 ISO and IEC maintain terminological databases for use in standardization at the following
219 addresses:

- 220 • IEC Electropedia: available at <https://www.electropedia.org/>
- 221 • ISO Online browsing platform: available at <https://www.iso.org/obp>

222 **3.1**

223 **actinic dose** (see IEV 845-26-035)

224 Quantity obtained by weighting spectrally the dose according to the actinic action spectrum value at the
225 corresponding wavelength.

226 Unit: $\text{J}\cdot\text{m}^{-2}$

227 NOTE to entry: This definition implies that an action spectrum is adopted for the actinic effect considered, and that its
228 maximum value is generally normalized to 1. When giving a quantitative amount, it is essential to specify which quantity dose or
229 actinic dose is meant, as the unit is the same.

230 **3.2**

231 **blue light hazard (BLH)**

232 Potential for a photochemically induced retinal injury resulting from radiation exposure at wavelengths
233 primarily between 400 nm and 500 nm. This damage mechanism dominates over the thermal damage
234 mechanism for times exceeding 10 seconds.