



**BSI Standards Publication**

# **Light and lighting — Lighting of work places**

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Part 1: Indoor work places

## National foreword

This British Standard is the UK implementation of EN 12464-1:2021. It supersedes BS EN 12464-1:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EL/1, Light and lighting applications.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Partie 1 : Lieux de travail intérieurs

Licht und Beleuchtung - Beleuchtung von  
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## European foreword

This document (EN 12464-1:2021) has been prepared by Technical Committee CEN/TC 169 “Light and lighting”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2022, and conflicting national standards shall be withdrawn at the latest by February 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12464-1:2011.

The original standard EN 12464-1:2002 was already further developed in its first revision EN 12464-1:2011. It specifies the requirements for good lighting solutions rather than giving design guidelines. With the experience of applying the standard next steps are taken in the development of this new edition and human and user needs are given broader acknowledgement. Lighting requirements for task areas to fulfil visual tasks are given a close relation to the space in which they are carried out. Technologically LED has taken over as the main light source from previous technologies. The main changes with respect to the previous edition are:

- The recommendations given in the tables in Clause 7 take user needs more into account than in the past. Thus, the requirements for necessary illuminance according to Clause 7 are more differentiated.
- The impact of visual and non-visual (non-image forming) effects of light on people's performance and well-being are elaborated in the new informative Annex B.
- Requirements for walls, ceilings and cylindrical illuminances are moved from the main text to the tables in Clause 7 for increased visibility and usability.
- A new chapter on design considerations (Clause 6) gives advice on how to apply the requirements when designing lighting for visual tasks and activities within a space.
- Relation between task area and its immediate surround and the background area is more detailed (5.3.3, 5.3.4, 5.3.5).
- Glare requirements have been clarified for improved usability including clarification for shielding in 5.5 and recommended practices for UGR in non-standard situations has been added in a new informative Annex A.
- Flicker and stroboscopic effect is updated (5.8).
- A new informative Annex C is introduced including examples on how to derive the requirements in different applications (office/industry) for designing lighting.
- A new informative Annex D is introduced to provide additional information on the specific requirements for railway installations that are given in Table 61.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



## Introduction

Adequate and appropriate lighting enables people to perform visual tasks efficiently and accurately including tasks performed over a prolonged time period or of a repetitive nature. The degree of visibility and comfort required in a wide range of work places is governed by the type and duration of the activity. The lighting also affects circadian rhythms and mood as well as improving our performance and well-being.

The final designed, installed and operated lighting system should provide efficient and effective good quality lighting for the user needs tailored to their visual capacity, e.g. elderly users in workplaces.

It is important that all clauses of this document are followed although the target values for lighting criteria and specific requirements, depending of each type of task/activity, are tabulated in the schedule of lighting requirements (see Clause 7).

This document reflects the generally recognized best practice.

## 1 Scope

This document specifies lighting requirements for humans in indoor work places, which meet the needs for visual comfort and performance of people having normal, or corrected to normal ophthalmic (visual) capacity. All usual visual tasks are considered, including Display Screen Equipment (DSE).

This document specifies requirements for lighting solutions for most indoor work places and their associated areas in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice including visual and non-visual (non-image forming) lighting needs. This document does not specify lighting requirements with respect to the safety and health of people at work and has not been prepared in the field of application of Article 169 of Treaty on the Functioning of the European Union although the lighting requirements, as specified in this document, usually fulfil safety needs.

**NOTE** Lighting requirements with respect to the safety and health of workers at work can be contained in Directives based on Article 169 of Treaty on the Functioning of the European Union, in national legislation of member states implementing these directives or in other national legislation of member states.

This document neither provides specific solutions, nor restricts the designers' freedom from exploring new techniques nor restricts the use of innovative equipment. The illumination can be provided by daylight, electric lighting or a combination of both.

This document is not applicable for the lighting of outdoor work places and underground mining or emergency lighting. For outdoor work places, see EN 12464-2 and for emergency lighting, see EN 1838 and EN 13032-3.

## 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.

EN 12193, *Light and lighting — Sports lighting*

EN 12665, *Light and lighting — Basic terms and criteria for specifying lighting requirements*

EN 17037:2018, *Daylight in buildings*

EN 60601-2-41:2009,<sup>1</sup> *Medical electrical equipment — Part 2-41: Particular requirements for basic safety and essential performance of surgical luminaires and luminaires for diagnosis*

EN ISO 9680, *Dentistry — Operating lights (ISO 9680)*

ISO 3864-1, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO/CIE TS 22012, *Light and lighting — Maintenance factor determination — Way of working*

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<sup>1</sup> As impacted by EN 60601-2-41:2009/A11:2011 and EN 60601-2-41:2009/A1:2015.

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665, EN 17037 and the following apply.

ISO and IEC maintain terminological 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

##### activity area

area which contains one or more visual tasks

Note 1 to entry: Visual tasks can be different in type and/or position.

Note 2 to entry: A room can contain one or more activity areas.

Note 3 to entry: The spatial orientation needs to be specified by the designer.

Note 4 to entry: An activity area is not to be considered as aggregation of a number of distinct task areas across a larger area.

#### 3.2

##### modelling

effect of directional lighting to reveal the depth, shape and texture of an object or person

[SOURCE: CIE S 017:2020, 17-29-170]

### 4 Symbols and abbreviations

$\bar{E}_{m,wall}$	maintained illuminance on walls	5.2.3
$\bar{E}_{m,ceiling}$	maintained illuminance on ceiling	5.2.3
$U_0$	illuminance uniformity	5.2.3
$\bar{E}_m$	maintained illuminance <sup>2</sup>	5.3.3
$\alpha$	shielding angle	5.5.2
$\gamma$	vertical photometric angle	5.5.2
DGP	Daylight Glare Probability	5.5.3.1
$R_{UG}$	CIE Unified Glare Rating (UGR)	5.5.3.2
$R_{UGL}$	$R_{UG}$ limit value	5.5.3.2
$\bar{E}_z$	average cylindrical illuminance <sup>3</sup>	5.6.2
$\bar{E}_{m,z}$	maintained average cylindrical illuminance	5.6.2

<sup>2</sup> According to EN 12655,  $\bar{E}_m$  is the value below which the average illuminance on a specified area shall not fall.

<sup>3</sup> approximation of the average of the four main directions