

STN	Svetlo a osvetlenie Osvetlenie pracovísk Časť 1: Vnútorne pracoviská	STN EN 12464-1 36 0074
------------	---	--

Light and lighting - Lighting of work places - Part 1: Indoor work places

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/21

Obsahuje: EN 12464-1:2021

Oznámením tejto normy sa ruší
STN EN 12464-1 (36 0074) z marca 2012

133805

EUROPEAN STANDARD

EN 12464-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2021

ICS 91.160.10

Supersedes EN 12464-1:2011

English Version

Light and lighting - Lighting of work places - Part 1: Indoor work places

Lumière et éclairage - Éclairage des lieux de travail -
Partie 1 : Lieux de travail intérieursLicht und Beleuchtung - Beleuchtung von
Arbeitsstätten - Teil 1: Arbeitsstätten in Innenräumen

This European Standard was approved by CEN on 9 May 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

Contents	Page
European foreword.....	5
Introduction	7
1 Scope	8
2 Normative references	8
3 Terms and definitions	9
4 Symbols and abbreviations	9
5 Lighting design criteria	10
5.1 Luminous environment	10
5.2 Luminance distribution	11
5.2.1 General.....	11
5.2.2 Reflectance of surfaces.....	12
5.2.3 Illuminance on surfaces.....	12
5.3 Illuminance.....	12
5.3.1 General.....	12
5.3.2 Scale of illuminance.....	12
5.3.3 Illuminances on the task area or activity area	13
5.3.4 Illuminance on the immediate surrounding area	14
5.3.5 Illuminance on the background area	15
5.3.6 Illuminance uniformity	15
5.4 Illuminance grid	16
5.5 Glare.....	18
5.5.1 General.....	18
5.5.2 Limiting luminaire luminance.....	19
5.5.3 Discomfort glare	20
5.5.4 Veiling reflections and reflected glare	22
5.6 Lighting in the interior space.....	22
5.6.1 General.....	22
5.6.2 Cylindrical illuminance requirement in the activity space.....	22
5.6.3 Modelling.....	22
5.6.4 Directional lighting of visual tasks	23
5.7 Colour aspects	23
5.7.1 General.....	23
5.7.2 Colour appearance of the light.....	23
5.7.3 Colour rendering.....	24
5.8 Flicker and stroboscopic effects	24
5.8.1 General.....	24
5.8.2 Flicker.....	24
5.8.3 Stroboscopic effect.....	25
5.9 Lighting of work stations with Display Screen Equipment (DSE).....	25
5.9.1 General.....	25
5.9.2 Luminaire luminance limits with downward flux.....	25
6 Lighting design considerations	26
6.1 General.....	26
6.2 Illuminance requirements and recommendations.....	27
6.2.1 General.....	27

6.2.2	Lighting of the task area or activity area and its immediate surrounding area (see 5.3)	27
6.2.3	Lighting of the space	27
6.2.4	Adjustability of the lighting system	28
6.3	Maintenance factor	28
6.4	Energy efficiency requirements	29
6.5	Additional benefits of daylight	29
6.6	Variability of light.....	30
6.7	Room brightness.....	30
7	Schedule of specific lighting requirements.....	30
7.1	Composition of the tables	30
7.2	Schedule of task and activity areas	31
7.3	Lighting requirements for task areas, activity areas, room and space brightness.....	33
8	Verification procedures	91
8.1	General	91
8.2	Illuminances	91
8.3	Unified Glare Rating.....	91
8.4	Colour rendering and colour appearance.....	91
8.5	Luminaire luminance	91
8.6	Maintenance schedule	91
Annex A	(informative) Recommended practice regarding implementation of UGR tabular method for 'non-standard' situations	92
A.1	General	92
A.2	Recommended Practices.....	92
A.2.1	Deviating luminaire sizes	92
A.2.2	Irregular area shapes.....	92
A.2.3	Irregular luminaire placement patterns.....	92
A.2.4	Deviating room reflectances.....	92
A.2.5	Multiple luminaire types.....	93
A.2.6	luminaires with (only) up-lighting or luminous ceilings.....	93
A.2.7	Room dimensions smaller or larger than the tabular values.....	93
Annex B	(informative) Additional information on visual and non-visual (non-image forming) effects of light.....	94
B.1	General	94
B.2	Perceived room brightness.....	94
B.3	Alternative parameters	94
B.3.1	General	94
B.3.2	Mean ambient illuminance, \bar{E}_{amb} (Govén et al.)[1]	94
B.3.3	Mean room surface luminous exitance, M_{rs} (Cuttle)[2].....	95
B.3.4	Visual lightness and interest - 40 degree band luminance (Loe et al.)[3].....	95
B.4	Adaptation luminance within the normal visual field	96
B.5	The influence of spectral power distribution on non-image forming effects.....	96

EN 12464-1:2021 (E)

B.6	Varying lighting conditions	96
B.7	Daylight provision	97
Annex C	(informative) Lighting design considerations - Examples	98
C.1	Example for offices	98
C.2	Example for industry machine workshop	99
C.3	Example for industrial machine workshop with inspection area	101
C.4	Example for electronics industry	102
Annex D	(informative) Transportation areas – Railway installations	104
D.1	Platform edge	104
D.2	Limitation of glare for train drivers	104
D.3	Maintenance sheds	104
D.4	Circulation areas	104
Annex E	(informative) A-deviations.....	105
Bibliography	106
Index	109

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.

EN 12464-1:2021 (E)

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.

EN 12464-1:2021 (E)

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 60601-2-41:2009,¹ *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*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN

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