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Light and lighting – Lighting of work places – Part 2: Outdoor work places

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Denna standard ersätter SS-EN 12464-2:2007, utgåva 1.

The European Standard EN 12464-2:2014 has the status of a Swedish Standard. This document contains the official version of EN 12464-2:2014.

This standard supersedes the Swedish Standard SS-EN 12464-2:2007, edition 1.

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EUROPEAN STANDARD

EN 12464-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2014

ICS 91.160.20

Supersedes EN 12464-2:2007

English Version

Light and lighting - Lighting of work places - Part 2: Outdoor work places

Lumière et éclairage - Éclairage des lieux de travail - Partie
2: Lieux de travail extérieurs

Licht und Beleuchtung - Beleuchtung von Arbeitsstätten -
Teil 2: Arbeitsplätze im Freien

This European Standard was approved by CEN on 7 December 2013.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Lighting design criteria	5
4.1 Luminous environment	5
4.2 Luminance distribution	6
4.3 Illuminance	6
4.3.1 General.....	6
4.3.2 Illuminance on the task area.....	6
4.3.3 Illuminance of surroundings	7
4.3.4 Illuminance grid	8
4.3.5 Uniformity and diversity.....	8
4.4 Glare.....	9
4.4.1 General.....	9
4.4.2 Glare rating.....	9
4.4.3 Veiling reflections and reflected glare.....	10
4.5 Obtrusive light.....	10
4.6 Directional lighting	11
4.6.1 General.....	11
4.6.2 Modelling	11
4.6.3 Directional lighting of visual tasks	11
4.7 Colour aspects	11
4.7.1 General.....	11
4.7.2 Colour appearance	12
4.7.3 Colour rendering.....	12
4.8 Flicker and stroboscopic effects.....	12
4.9 Maintenance factor (<i>MF</i>)	12
4.10 Energy considerations	13
4.11 Sustainability.....	13
5 Schedule of lighting requirements.....	13
5.1 General.....	13
5.2 Composition of the Tables 5.1 to 5.15 below	14
5.3 The schedule of areas, tasks and activities	14
5.4 Lighting requirements for areas, tasks and activities	15
6 Verification procedures.....	21
6.1 General.....	21
6.2 Illuminance	21
6.3 Glare Rating.....	21
6.4 Colour Rendering Index and colour appearance	21
6.5 Obtrusive light.....	21
6.6 Maintenance schedule	21
Annex A (informative) A–deviations	22
Bibliography	23
Index of areas, tasks and activities.....	24

Foreword

This document (EN 12464-2:2014) 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 July 2014, and conflicting national standards shall be withdrawn at the latest by July 2014.

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

This document supersedes EN 12464-2:2007.

Significant changes between this document and EN 12464-2:2007 are:

- a) the terms and definitions were deleted to avoid duplication with EN 12665;
- b) symbols were aligned with EN 12665;
- c) Figure 1 was corrected;
- d) 4.4.2 "Glare rating", the reflectance has a default value of $\rho = 0,15$;
- e) 4.7.3 "colour rendering", aligned with EN 12464-1;
- f) 4.10 "energy considerations", aligned with EN 12464-1 and extended;
- g) subclause 5.1, insertion of requirements regarding routine cleaning of work spaces;
- h) Table 5.1 "General requirements for areas and for cleaning at outdoor work places", title changed and new activity added;
- i) Table 5.12 "Railways and tramways", updated and extended;
- j) Clause 6 "Verification procedures", revised and harmonized with EN 12464-1.

EN 12464, *Light and lighting - Lighting of work places* consists of the following parts:

- *Part 1: Indoor work places*
- *Part 2: Outdoor work places*

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

SS-EN 12464-2:2014 (E)

Introduction

To enable people to perform outdoor visual tasks efficiently and accurately, especially during the night, adequate and appropriate lighting should be provided.

The degree of visibility and comfort required in a wide range of outdoor work places is governed by the type and duration of activity.

This standard specifies requirements for lighting of tasks in most outdoor work places and their associated areas in terms of quantity and quality of illumination. In addition recommendations are given for good lighting practice.

It is important that all clauses of the standard are followed although the specific requirements are tabulated in the schedule of lighting requirements (see Clause 5).

1 Scope

This European Standard specifies lighting requirements for outdoor work places, which meet the needs for visual comfort and performance. All usual visual tasks are considered. This European Standard is not applicable for emergency lighting; see EN 1838 and EN 13032-3.

This European Standard does not specify lighting requirements with respect to the safety and health of workers at work and has not been prepared in the field of application of Article 153 of the EC treaty, although the lighting requirements, as specified in this standard, usually fulfil safety needs. Lighting requirements with respect to the safety and health of workers at work may be contained in Directives based on Article 153 of the EC treaty, in national legislation of member states implementing these directives or in other national legislation of member states.

This European Standard neither provides specific solutions, nor restricts the designer's freedom from exploring new techniques nor restricts the use of innovative equipment.

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.

EN 12665:2011, *Light and lighting - Basic terms and criteria for specifying lighting requirements*

EN 13201-2, *Road lighting - Part 2: Performance requirements*

EN 13201-3, *Road lighting - Part 3: Calculation of performance*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665:2011 apply.

4 Lighting design criteria

4.1 Luminous environment

For good lighting practice it is essential that, in addition to the required illuminance, other qualitative and quantitative needs are satisfied.

Lighting requirements are determined by the satisfaction of three basic human needs:

- visual comfort, where the workers have a feeling of well-being; in an indirect way also contributing to a high productivity level,
- visual performance, where the workers are able to perform their visual tasks, even under difficult circumstances and during longer periods,
- safety.

Main parameters determining the luminous environment are:

- luminance distribution,

SS-EN 12464-2:2014 (E)

- illuminance,
- glare,
- directionality of light,
- colour rendering and colour appearance of the light,
- flicker.

Values for illuminance and its uniformity, discomfort glare and colour rendering index are given in Clause 5; other parameters are described in Clause 4.

NOTE Intentionally improved and designed luminous environment, glare-free illumination, good colour rendering, high contrast markings and optical and tactile guiding systems can improve visibility and sense of direction and locality. See CIE 196:2011.

In addition to the lighting, there are other visual ergonomic parameters which influence visual performance, such as:

- the intrinsic task properties (size, shape, position, colour and reflectance properties of detail and background),
- ophthalmic capacity of the person (visual acuity, depth perception, colour perception),

Attention to these factors can enhance visual performance without the need for higher illuminance.

4.2 Luminance distribution

The luminance distribution in the visual field controls the adaptation level of the eyes, which affects task visibility.

A well balanced luminance distribution is needed to increase:

- visual acuity (sharpness of vision),
- contrast sensitivity (discrimination of small relative luminance differences),
- efficiency of the ocular functions (such as accommodation, convergence, pupillary contraction, eye movements).

The luminance distribution in the visual field also affects visual comfort. Sudden changes in luminance should be avoided.

4.3 Illuminance

4.3.1 General

The illuminance and its distribution on the task area and the surrounding area have a great impact on how quickly, safely and comfortably a person perceives and carries out the visual task.

All values of illuminances specified in this standard are maintained illuminances and will provide for visual comfort, visual performance and safety needs.

All illuminance average and uniformity values are dependent upon the grid definition (see 4.3.4).

4.3.2 Illuminance on the task area

The values given in Clause 5 are maintained illuminances over the task area on the reference surface, which may be horizontal, vertical or inclined. The average illuminance for each task shall not fall below the value given in Clause 5, regardless of the age and condition of the installation.

The values are valid for normal visual conditions and take into account the following factors:

- psycho-physiological aspects such as visual comfort and well-being,
- requirements for visual tasks,
- visual ergonomics,
- practical experience,
- safety,
- economy.

The value of illuminance may be adjusted by at least one step in the scale of illuminances (see below), if the visual conditions differ from the normal assumptions.

A factor of approximately 1,5 represents the smallest significant difference in subjective effect of illuminance. The recommended scale of illuminance (in lx) is:

5 – 10 – 15 – 20 – 30 – 50 – 75 – 100 – 150 – 200 – 300 – 500 – 750 – 1 000 – 1 500 – 2 000

The required maintained illuminance should be increased, when:

- visual work is critical,
- visual task or worker is moving,
- errors are costly to rectify,
- accuracy or higher productivity is of great importance,
- the visual capacity of the worker is below normal,
- task details are of unusually small size or low contrast,
- the task is undertaken for an unusually long time.

The required maintained illuminance may be decreased when:

- task details are of an unusually large size or high contrast,
- the task is undertaken for an unusually short time or on only rare occasions.

4.3.3 Illuminance of surroundings

The illuminance of surrounding areas shall be related to the illuminance of the task area and should provide a well-balanced luminance distribution in the visual field.

Large spatial variations in illuminances around the task area may lead to visual stress and discomfort.

The illuminance of the surrounding areas may be lower than the task illuminance but shall be not less than the values given in Table 1.

The surrounding area should be a band with a width of at least 2 m around the task area within the visual field.