SLOVENSKI STANDARD
oSIST prEN 1837:2019

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Varnost strojev - Integralna razsvetljava strojev

Safety of machinery - Integral lighting of machines

Sicherheit von Maschinen - Maschinenintegrierte Beleuchtung

Sécurité des machines - Éclairage intégré aux machines

Ta slovenski standard je istoveten z: **prEN 1837**

ICS:

13.110	Varnost strojev	Safety of machinery
91.160.10	Notranja razsvetljava	Interior lighting

oSIST prEN 1837:2019 **en,fr,de**

EUROPEAN STANDARD

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English Version

Safety of machinery - Integral lighting of machines

Sécurité des machines - Éclairage intégré aux machines

Sicherheit von Maschinen - Maschinenintegrierte Beleuchtung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 169.

If this draft becomes a European Standard, 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.

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

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

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European foreword

This document (prEN 1837:2019) has been prepared by Technical Committee CEN/TC 169 "Light and lighting", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1837:1999+A1:2009.

In comparison with the previous edition, the following technical modifications have been made:

— restructuring and adding of terms of EN 12464-2 to Clause 3 Terms and definitions;

— adding of environmental requirements to Clause 5 Lighting equipment and installation;

— addition of subclause 5.6 Service and maintenance;

— updating of Clause 6 Verification procedures;

— deletion of Annex ZA as Directive 98/37/EC is no longer in force and repealed by Directive 2006/42/EC.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document is a type B standard as stated in EN ISO 12100. The machinery concerned and the extent to which hazards are covered are indicated in the scope of this document.

Introduction

To illuminate visual tasks within and/or at machines integral lighting systems (built in or at machines) can be required. These integral lighting systems require special characteristics that allow both safe use and efficient performance of the visual task by the operator during operation and service.

1 Scope

This document specifies the parameters of integral lighting systems designed to provide illumination in and/or at both stationary and mobile machines to enable the safe use of the machine and the efficient performance of the visual task within and/or at the machine to be carried out by the operator.

This document does not specify lighting systems mounted on the machine to specifically illuminate visual tasks outside the machine. The function and requirements of these systems are specified in the European Standard dealing with the lighting of work places, see EN 12464-1 and EN 12464-2 for further information.

This document does not specify additional requirements for the operation of lighting systems:

— in severe conditions (extreme environmental conditions such as freezer applications, high temperatures, etc.);

— subject to special rules (e.g. explosive atmospheres);

— where the transmittance is reduced by environmental conditions, such as smoke, splashing, etc.

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 12464-1, *Light and lighting — Lighting of work places — Part 1: Indoor work places*

EN 12464-2, *Light and lighting — Lighting of work places — Part 2: Outdoor work places*

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

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN 60598-1, *Luminaires — Part 1: General requirements and tests (IEC 60598 1)*

EN 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) (IEC 62262)*

EN ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12464-1, EN 12464-2 and EN 12665 and the following apply

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
intended use of a machine
use of a machine in accordance with the information provided in the user information

4 Lighting requirements

4.1 General

When arranging the lighting for machines, ergonomic and lighting-engineering principles shall be taken into account.

The visual tasks to be carried out in and/or at the machine vary in size, contrast, position and speed of movement. Thus for adequate vision, the exact lighting condition required shall be determined from detailed task analysis.

The lighting requirements specified in this document are based on average difficulty of visual tasks, found in the work space during intended use of the machine (normal operation, abnormal operation, servicing).

For specific tasks, reference shall be made to the relevant standards on work place lighting (EN 12464-1 and EN 12464-2).

4.2 Illuminance

The required illuminance depends upon the visual task and shall be sufficiently high and uniform as to enable a safe and comfortable perception of the details of the visual task.

In general a maintained illuminance of at least 500 lx with a minimum uniformity of 0,7 on the task area shall be provided. If there is more than one task area in or at a machine (e.g. in or at large machines), each task area shall be considered separately. The immediate surrounding areas shall have a maintained illuminance of at least 300 lx with a uniformity of at least 0,3.

Where a visual aid or protective visor is required for use with the machine, the illuminance shall be multiplied by the reciprocal value of the transmittance of this device. Where the transmittance is unknown the illuminance shall be increased by at least 50 %.

In control cabins or where processes are affected by light, the above illuminance may be reduced.

NOTE Lighting controls can be helpful for increasing and reducing the illuminance, e.g. by dimming or switching or by mechanical adjustment.

4.3 Glare

The integral lighting system shall avoid direct glare (disability and discomfort glare) both to the machine operator and other workers in adjacent areas. Any reflected glare shall be avoided as far as possible.

NOTE It is possible to achieve this by suitable shielding of the lamp(s), by location and direction of the luminaire(s), and by the use of light, matt surface finishes.

4.4 Directionality

The lighting system shall be designed and adjusted to avoid disturbing shadows on the visual task.

The directionality of the lighting shall ensure a perception of form which is appropriate for the visual task.

4.5 Colour quality

The colour rendering properties and colour appearance of the lamp(s) and/or luminaires shall be suitable for colour discrimination of the visual task and for operator comfort.

4.6 Stroboscopic effect

The lighting system shall be designed to avoid adverse stroboscopic effect [9] which can lead to dangerous situations by changing the perceived motion of rotating or reciprocating machinery.

NOTE This can usually be achieved by limitation of the magnitude of temporal light modulations of the lighting system and/or by avoiding that the modulation frequency of the light coincides with motion or rotation frequencies of the machinery, for example by use of DC electrical supply for light sources, or by operating the light sources at high frequencies. Intrinsically suitable lighting systems producing minimum adverse stroboscopic effect are incandescent lighting connected to AC electrical supply. LED (light emitting diode) lighting or fluorescent lighting can be adequate as well, provided the control gear modulation frequency is sufficiently high or the modulation depth of the residual light modulation is sufficiently low.

4.7 Ergonomic principles

Ergonomic principles shall be taken into consideration for integral lighting systems of a machine e.g.:

— adjustable luminaires shall be stable in their position, but easy to move if necessary, particularly if changing from a seated to a standing position;

— actuators shall be adequate for the intended use.

4.8 Emergency lighting

Emergency lighting shall be provided in large machines that may be operational at times when the supply to the normal lighting of the machinery has failed (see EN 1838).

5 Lighting equipment and installation

5.1 Lamps

Lamps shall be chosen to be safe in operation, energy efficient and not present a hazard to the machine operator. The chosen lamp shall comply with the relevant standard, energy label and RoHS requirements. The disposal of lamps at the end of life shall comply with the WEEE directive.

NOTE It is advisable that in general lamps are enclosed to protect the operator from injury caused by e.g. damaged lamps, excessive heat or emission of harmful radiation.

5.2 Luminaires

Luminaires shall be designed to:

a) provide the required lighting on the task;

b) minimize the accumulation of dirt on lamps and optical surfaces;

c) minimize premature ageing of optical elements;

d) facilitate ease of service, particularly ease of cleaning;

e) comply with EN 60598-1;