



SLOVENSKI STANDARD
SIST EN 1837:1999+A1:2009
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BUXca Yý U
SIST EN 1837:1999

Varnost strojev - Integralna razsvetljava strojev

Safety of machinery - Integral lighting of machines

Sicherheit von Maschinen - Maschinenintegrierte Beleuchtung

Sécurité des machines - Eclairage intégré aux machines

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ICS:

13.110	Varnost strojev	Safety of machinery
91.160.10	Notranja razsvetljava	Interior lighting

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EUROPEAN STANDARD

EN 1837:1999+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Safety of machinery - Integral lighting of machines

Sécurité des machines - Eclairage intégré aux machines

Sicherheit von Maschinen - Maschinenintegrierte
Beleuchtung

This European Standard was approved by CEN on 25 January 1999 and includes Amendment 1 approved by CEN on 30 July 2009.

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 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 Management Centre has the same status as the official versions.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 1837:1999+A1:2009) 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of an identical text or by endorsement, at the latest by March 2010, and conflicting national standards shall be withdrawn at the latest by March 2010.

This document includes Amendment 1, approved by CEN on 2009-07-30.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$.

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 European Standard 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).

$\boxed{A_1}$ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. $\boxed{A_1}$

$\boxed{A_1}$ This European Standard 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 standard. $\boxed{A_1}$

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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 standard 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.

This standard 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. This European Standard is under preparation.

This standard does not establish 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.

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2 Normative references

Ⓐ₁ The following referenced documents are indispensable for the application of this document. For dated references only the edition cited applies. For undated references, the last edition of the referenced document (including any amendments) applies. Ⓐ₁

Ⓐ₁ *deleted text* Ⓐ₁

Ⓐ₁ *deleted text* Ⓐ₁

Ⓐ₁ EN 1838, *Lighting applications – Emergency lighting* Ⓐ₁

Ⓐ₁ *deleted text* Ⓐ₁

Ⓐ₁ EN 12464-1:2002, *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* Ⓐ₁

Ⓐ₁ EN 12665:2002, *Light and lighting – Basic terms and criteria for specifying lighting requirements* Ⓐ₁

Ⓐ₁ EN ISO 12100-1:2003, *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles (ISO 12100-2:2003)* Ⓐ₁

3 **A1** Terms and definitions **A1**

A1 For the purposes of this document, the terms and definitions given in EN 12464-1:2002 and EN 12665:2002 together with the following apply. **A1**

3.1

machinery (machine)

An assembly of linked parts or components, at least one of which moves, with the appropriate machine actuators, control and power circuits, etc., joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material.

The term "machinery" also covers an assembly of machines which, in order to achieve one and the same end, are arranged and controlled so that they function as an integral whole. **A1** [EN ISO 12100-1:2003] **A1**

3.2

integral lighting system (of a machine)

a lighting system consisting of lamp(s), luminaire(s) and associated mechanical and electrical control devices which forms a permanent part of the machine, designed to provide illumination in and/or at the machine

A1 3.3

intended use of a machine

use of a machine in accordance with the information provided in the user information (see EN ISO 12100-1:2003, 3.22) **A1**

4 **A1** Lighting requirements **A1**

4.1 **A1** General **A1**

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.

A1 The lighting requirements specified in this European Standard 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). **A1**

4.2 **A1** Illuminance **A1**

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.

A1 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. **A1**

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 %.

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

A1 NOTE Lighting controls can be helpful for increasing and reducing the illuminance level, e.g. by dimming or switching or by mechanical adjustment. **A1**

4.3 Glare

The integral lighting system shall avoid direct 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) shall be suitable for colour discrimination of the visual task and for operator comfort.

4.6 Stroboscopic effect

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

NOTE This can usually be achieved for example by use of DC electrical supply for incandescent lamps, or by operating incandescent or discharge lamps at high frequencies (around 30 kHz).

A1

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 seating to 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). **A1**

5 Lighting equipment and installation**5.1 Lamps**

Lamps shall be chosen to be safe in operation and not present a hazard to the machine operator.

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) A_1 facilitate ease of service, particularly ease of cleaning, A_1
- e) comply with EN 60598,
- f) be compatible with the machine, for example withstand vibration, radiation, etc.

A_1 NOTE 1 Safety requirements for luminaires are provided in other standards, particularly in EN 60598-1.

NOTE 2 Some additional requirements of luminaires can be found in other standards (e. g. for protection classes in EN 60529). A_1

5.3 Installation

Luminaires shall be mounted in such a way as to:

- a) provide the required lighting on the task;
- b) avoid interference with the task and hazard to the operator;
- c) minimize the accumulation of dirt on lamp(s) and luminaire(s);
- d) facilitate ease of service.

Examples showing the principles of some possible solutions are given in the informative Annex A.

5.4 Availability of illumination

Where failure of the integral lighting system of the machine can give rise to dangerous conditions the lighting system shall consist of more than one light source. One of these sources shall be supplied from an alternative electrical supply.

5.5 Electrical supply

The lighting system shall be connected to the electrical supply so that it is capable of operation even when the machine is switched off.

6 Verification procedures

The manufacturer of the machine with integral lighting shall:

- a) measure the illuminance and check the uniformity (E_{\min} / \bar{E}) in the task area and the immediate surroundings.