



# SLOVENSKI STANDARD

## SIST EN 1837:1999

01-november-1999

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### Varnost strojev - Integralna razsvetljava strojev

Safety of machinery - Integral lighting of machines

Sicherheit von Maschinen - Maschinenintegrierte Beleuchtung

Sécurité des machines - Eclairage intégré aux machines

Ta slovenski standard je istoveten z: **EN 1837:1999**

[SIST EN 1837:1999](https://standards.iteh.ai/catalog/standards/sist/13ad2fe0-208e-4a8c-b433-b153c2be9839/sist-en-1837-1999)

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#### **ICS:**

13.110	Varnost strojev	Safety of machinery
91.160.10	Notranja razsvetljava	Interior lighting

**SIST EN 1837:1999**

**en**

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EUROPEAN STANDARD

EN 1837

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EUROPÄISCHE NORM

February 1999

ICS 13.110; 91.160.10

Descriptors: safety of machines, accident prevention, lighting, human factor engineering, lighting equipment, luminaires, lamps, illuminance, quality, installation, inspection, maintenance

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.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This European Standard 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 August 1999, and conflicting national standards shall be withdrawn at the latest by August 1999.

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).

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European Standard is a type B standard as stated in EN 292-1 and is a supplement to EN 292-2. The machinery concerned and the extent to which hazards are covered are indicated in the scope of this standard.

## 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.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1	1991	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN 292-2	1995	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN 1070	1998	Safety of machinery - Terminology
EN 60598		Luminaires
prEN 12464		Lighting applications - Lighting of work places
prEN 12665		Lighting applications - Basic terms and criteria for specifying lighting requirements

### 3 Definitions

For the purposes of this standard, the following definitions and the definitions of prEN 12665 apply:

#### 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. [EN 1070: 1998]

#### 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.

### 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 standard are based on average difficulty of visual tasks, found in the work space during operation or maintenance and servicing.

For specific tasks, reference shall be made to the relevant standards on work place lighting (i.e. prEN 12464).

#### 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 shall be provided with a minimum uniformity ( $E_{\min}/\bar{E}$ ) of 0,7 on the task area and 0,3 in the immediate surroundings of the task.

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.

#### 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

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).



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

### 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

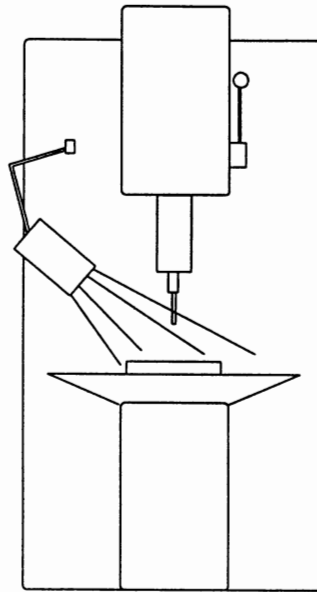
The manufacturer of the machine with integral lighting shall:

- a) measure the illuminance and check the uniformity ( $E_{min}/\bar{E}$ ) in the task area and the immediate surroundings. Illuminance should be measured with an illuminance-meter having a cosine and  $V(\lambda)$  corrected photocell,
- b) check by visual inspection that glare control, directionality, colour properties and stroboscopic controls are satisfactory,
- c) provide a test report of the lighting system,
- d) supply a testing and maintenance schedule.

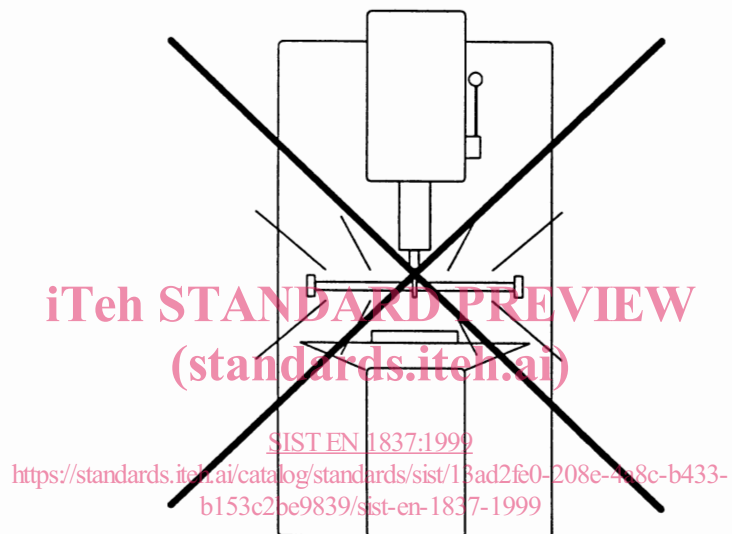
## 7 Information for use

The performance of the lighting system shall be checked regularly, at least once a year, in accordance with 6 d) and appropriate action shall be taken.

The lighting system shall be cleaned and maintained as given in the machine's maintenance schedule in accordance with 6 d).

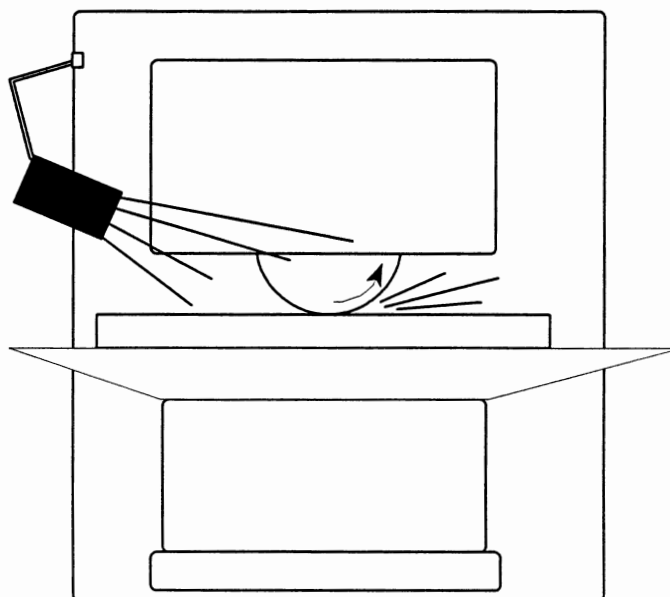
**ANNEX A** (informative)**Examples**

**Figure A.1: Drilling machine with glare-free lighting from one side**

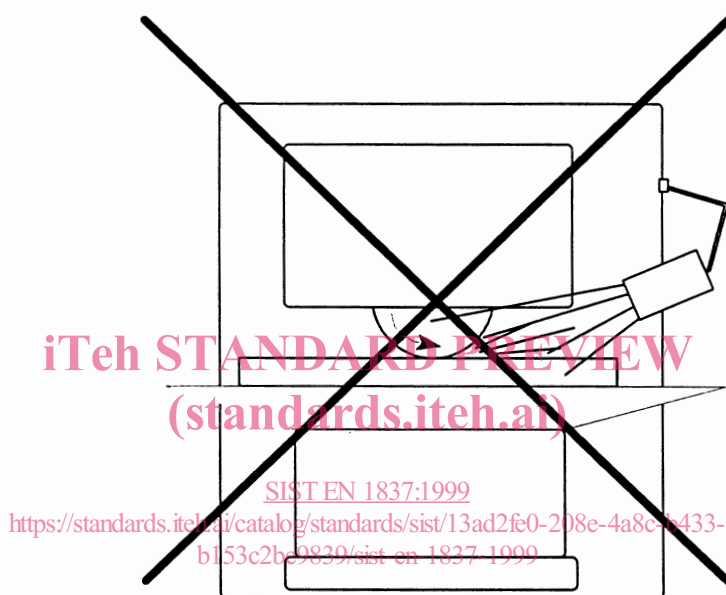


**Figure A.2: Drilling machine with unscreened luminous strip, causing glare**





**Figure A.3: Grinding machine with glare-free lighting from one side. Careful positioning prevents excessive soiling of the luminaire.**



**Figure A.4: Grinding machine with lighting from one side. The luminaire is exposed to excessive soiling.**