



SLOVENSKI STANDARD

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Nadomešča:
SIST EN 13272:2004

Železniške naprave - Električna razsvetljava v železniških vozilih za javne prevozne sisteme

Railway applications - Electrical lighting for rolling stock in public transport systems

Bahnanwendungen - Elektrische Beleuchtung in Schienenfahrzeugen des öffentlichen Verkehrs

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Applications ferroviaires - Eclairage électrique pour matériel roulant des systèmes de transport public

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EUROPEAN STANDARD

EN 13272

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Railway applications - Electrical lighting for rolling stock in public transport systems

Applications ferroviaires - Eclairage électrique pour matériel roulant des systèmes de transport public

Bahnanwendungen - Elektrische Beleuchtung in Schienenfahrzeugen des öffentlichen Verkehrs

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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.

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Foreword

This document (EN 13272:2012) has been prepared by Technical Committee CEN/TC 256 "Railway applications", 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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

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 13272:2001.

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.

The main changes with respect to the previous edition are: technical requirements have been brought in line with the applicable TSIs; and requirements permitting new lighting technologies.

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, 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.

EN 13272:2012 (E)**1 Scope**

This European Standard contains performance requirements and recommendations for electrical lighting systems in the interiors of public transport railway rolling stock under all operating and emergency conditions. This European Standard does not address lighting installed in instruments or controls.

2 Normative references

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

CEN/TS 45545 (all parts), *Railway applications — Fire protection on railway vehicles*

EN 50121 (all parts), *Railway applications — Electromagnetic compatibility*

EN 50153, *Railway applications — Rolling Stock — Protective provisions relating to electrical hazards*

CIE S 008/E:2001/8995-1:2002(E) *Lighting of Work Places — Part 1: Indoor [incl. Technical Corrigendum ISO 8995:2002/Cor.1 2005(E)]*

CIE Publication No 17.4, *International Lighting Vocabulary*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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3.1 General**3.1.1****passenger area**

all areas designed for passenger use

3.1.2**service area**

all areas which are intended to be occupied by service personnel only

3.1.3**seating area**

passenger area intended for seated persons, including wheelchair spaces

3.1.4**open gangway**

wide gangway designed to be occupied by travelling passengers

Note 1 to entry: This excludes the gangways that are only to be used to pass from one vehicle to another.

3.1.5**vehicle access step**

first fixed part of the floor threshold inside the vehicle

3.1.6**luminance (in a given direction at a given point of surface) (L)**

luminous intensity of the light emitted in a given direction from an element of the surface, divided by the area of the element projected in the same direction

Unit: candela per square metre (cd/m^2)

Note 1 to entry: Adapted from EN 12665.

3.1.7**luminous flux (Φ)**

quantity derived from radiant flux (radiant power) by evaluating the radiation according to the spectral sensitivity of the human eye (as defined by the CIE standard photometric observer)

Unit: lumen (lm)

Note 1 to entry: It is the light power emitted by a source.

Note 2 to entry: Adapted from EN 12665.

3.1.8**illuminance (E)**

ratio of the luminous flux incident on a surface to the area of the illuminated surface

Unit: lux (lx) = lm/m^2

Note 1 to entry: Illuminance was previously known as the illumination level or value.

Note 2 to entry: The orientation of the surface may be defined, e.g. horizontal, vertical.

3.1.9**average illuminance (E_{av})**

illuminance averaged over the specified surface

Unit: lux (lx)

Note 1 to entry: Adapted from EN 12665.

Note 2 to entry: In practice this may be derived either from the total luminous flux falling on the surface divided by the total area of the surface, or alternatively from an arithmetic average of the illuminances at a representative number of points on the surface.

3.1.10**illuminance uniformity**

ratio of the least favourable illuminance to the average illuminance within the specified measurement surface

Note 1 to entry: The least favourable illuminance may be either the minimum or maximum illuminance over all the measurement points.

3.1.11**correlated colour temperature (of a light source) (T_{cp})**

temperature of a Planckian radiator whose perceived colour most closely resembles that of the given stimulus at the same brightness and under specified viewing conditions

Unit: Kelvin (K)

Note 1 to entry: Adapted from EN 12665.

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EN 13272:2012 (E)**3.1.12****colour rendering**

effect of an illuminant on the reflective colour of objects by comparison with their reflective colour under a reference light source

Note 1 to entry: Adapted from IEC 60050-845-02-59.

3.1.13**light loss factor**

ratio of the average illuminance of the illuminated surface after a certain period of use of a lighting installation to the average illuminance obtained under the same conditions for the installation considered conventionally as new

Note 1 to entry: Adapted from IEC 60050-845-09-59.

3.1.14**unified glare rating**

CIE discomfort glare measure

3.1.15**contractor(s)**

organization(s) responsible for

— the design, manufacture or supply of the lighting system, and

— the purchase, installation or use of the lighting system

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3.2 Types of lighting**3.2.1****general lighting**

lighting of an interior provided for normal operation

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3.2.2**stand-by lighting**

lighting condition below the level of general lighting provided for a specified time limit, taking supply interruptions into account

3.2.3**emergency lighting**

lighting provided for a specified minimum time limit when the general or the stand-by lighting fails

3.2.4**reduced lighting**

level of illumination as a design feature for passenger comfort and energy conservation

4 Requirements for lighting in passenger areas**4.1 General lighting****4.1.1 General**

The quality of lighting influences visual performance, performance attitude, safety at work and general well-being.

The lighting for rolling stock in public transport systems shall enable a range of visual tasks to be performed.

The requirements to be met by the lighting system are based on the following criteria:

- illuminance;
- uniformity;
- limitation of glare;
- colour temperature and colour rendering.

General lighting must achieve the values set out in Table 1 or Table 2.

NOTE Where agreed by contractors, it is possible for the general lighting system to adapt to the ambient lighting, provided that the contribution from the general lighting system plus that from the ambient lighting achieves the values set out in Table 1 or Table 2.

For high speed trains and conventional trains:

- general lighting shall be provided in normal operation without interruption;
- in the event of loss of the main power supply, general lighting shall be provided for a period of not less than 10 minutes.

A lighting system can only satisfy specified requirements if all criteria mentioned above have been taken into account. Depending on the type and level of the difficulty of the visual task, orientation of seating, or of the type of accommodation to be lit, priority may be given to one or more of these criteria.

4.1.2 Illuminance and uniformity

Different requirements are made concerning the general lighting for rolling stock in public transport systems according to the service and/or location. Two classes of vehicles are defined: (a) high speed and conventional trains and (b) other trains.

- a) For high speed and conventional trains, which travel on either or both of the high speed and conventional trans-European rail systems, the minimum value of the average illuminance and uniformity requirements shall be in accordance with Table 1.
- b) For other trains, the minimum value of the average illuminance and uniformity requirements shall be in accordance with Table 2.

Table 1 — Minimum values of average illuminance and target uniformity for high speed and conventional trains

Location	Illuminance ^a E_{av} in lx	Uniformity
Seating areas where no additional reading lights are provided ^b	≥ 150	0,7 to 1,3
Seating area with reading lights which are switched off ^{b, c}	≥ 100	0,7 to 1,3
Reading zone, where reading lights are provided	≥ 150	0,7 to 1,3
Side corridors and aisles, at floor level	≥ 50	0,5 to 2,5
Side corridors and aisles, at 0,8 m above floor level	≥ 75	0,5 to 2,5
Vestibules	≥ 75	0,8 to 1,2
Vehicle access steps ^d	≥ 75	not applicable
Toilets, washrooms	≥ 150	not applicable
Steps and stairs	≥ 75	0,8 to 1,2
Standing areas, multifunctional areas, open gangways	≥ 75	0,5 to 2,5
Gangways	≥ 50	not applicable
Tables	≥ 150	0,7 to 1,3

^a The values for illuminance are minimum values and may be increased by agreement between contractors.

^b Where the average illuminance is greater than 220 lux, the uniformity range 0,7 to 1,5 shall apply.

^c In the case of seating areas in dining cars, the uniformity requirements shall not apply and alternative illuminance levels may be agreed between contractors.

^d Measured across the central 80 % of the width of the vehicle access step by a light placed within or immediately adjacent to it, according to Annex B (normative).

Table 2 — Minimum values of average illuminance and target uniformity for other trains

Location	Illuminance ^a E_{av} in lx	Uniformity
Seating areas	≥ 150	0,8 to 1,2
Standing areas, open gangways	≥ 50	0,5 to 2,5
Aisles at floor level	≥ 50	0,5 to 2,5
Aisles at 0,8 m above floor level	≥ 75	0,5 to 2,5
Vestibules ^b	≥ 75	0,8 to 1,2
Vehicle access steps ^c	≥ 75	not applicable
<p>^a The values for illuminance are minimum values and may be increased by agreement between contractors.</p> <p>^b With additional but switched-off threshold / step lighting.</p> <p>^c Measured across 80 % of the width of the vehicle access step by a light placed within or immediately adjacent to it, according to Annex B (normative).</p>		

The values of illuminance given in this clause shall be achieved in the different locations in accordance with the measuring points in 6.4.

4.1.3 Glare limitation

The lighting system shall be designed to minimize glare and to avoid glare from night time reflections in windows. The glare rating for the lighting system, when calculated using the Unified Glare Rating (UGR) tabular method set out in CIE S 008 / ISO 8995, shall be not greater than 22.

4.1.4 Correlated colour temperature

The correlated colour temperature of the lamps used for general lighting shall be between 2 800 K and 7 000 K.

NOTE For reasons of visual comfort, colour temperatures above 5 000 K are not advisable.

4.1.5 Colour rendering

The ability of a light source to render colours of surfaces accurately is important for safety and comfort. The Colour Rendering Index R_a of the light sources as defined in CIE 17.4, shall be ≥ 80 or colour rendering group 1B.

4.1.6 Illuminance in vehicles for night service

In vehicles that are intended predominantly for night service, the lighting shall be arranged to meet particular requirements concerning minimum illuminance.

- In passenger seating areas, the emergency lighting illuminance requirements of 4.3.3 shall apply.
- In sleeping compartments, individual subdued sleeping lighting should be provided. Where provided, general light switches shall be internally lit.