SLOVENSKI STANDARD
SIST EN 13272-1:2020

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Nadomešča:
SIST EN 13272:2012

Železniške naprave - Električna razsvetljava v železniških vozilih za javne prevozne sisteme - 1. del: Železniška vozila za višje osne pritiske

Railway applications - Electrical lighting for rolling stock in public transport systems - Part 1: Heavy rail

Bahnanwendungen - Elektrische Beleuchtung in Schienenfahrzeugen des öffentlichen Verkehrs - Teil 1: Vollbahnen

Applications ferroviaires - Éclairage électrique pour matériel roulant des systèmes de transport public - Partie 1 : Rail lourd

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

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European foreword

This document (EN 13272-1:2019) 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of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

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

This document, together with EN 13272-2:2019, supersedes EN 13272:2012.

The main changes with respect to EN 13272:2012 are:

— technical requirements have been brought in line with the applicable TSIs;

— requirements permitting new lighting technologies.

This series of documents *Railway applications — Electrical lighting for rolling stock in public transport systems* consists of the following parts:

— Part 1: *Heavy rail* (this document);

— Part 2: *Urban rail*.

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 Directive 2016/797/EC.

For relationship with Directive 2016/797/EC, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document sets out the requirements for interior lighting for heavy rail units.

This document was revised following the creation of EN 13272-2 for urban rail vehicles. This document was re-named to make a clear distinction between heavy rail and urban rail. Additionally, Annex ZA was updated for the current status of TSIs.

1 Scope

This document contains performance requirements and recommendations for electrical lighting systems in the interiors of public transport heavy rail units, under all operating and emergency conditions.

This document applies only to new units.

The application of this document for retro-fitting of existing units is subject to agreement between Contractors.

This document also defines the requirements for testing and conformity assessment.

This document does not address lighting installed in instruments or controls.

This document does not address the requirements of lighting of boarding aids, e.g. moving entrance stairs or lifts.

This document does not address lighting installed for indication or effect purposes, including flashing lights and decorative lighting.

NOTE 1 The requirements for interior lighting for urban rail units can be found in EN 13272–2.

NOTE 2 The requirements for cab instrument lighting for heavy rail units can be found in EN 16186–2.

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.

IEC 60050-845:1987/AMD1:2016,[1] *International Electrotechnical Vocabulary Chapter 845: Lighting*

ISO 8995-1:2002, *Lighting of work places — Part 1: Indoor*

EN 62031:2008+A2:2015, *LED modules for general lighting - Safety specifications*

EN 62471:2008, *Photobiological safety of lamps and lamp systems*

IEC/TR 62778, *Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 https://www.iso.org/obp

3.1 General

3.1.1
high speed unit
heavy rail unit designed to operate at speeds equal to or greater than 250 km/h

[1] IEC 60050-845:1987/AMD1:2016 is identical to CIE Publication No. CIE S 017/E:2011.

Note 1 to entry: The intention is to accord with Commission Regulation 1299/2014 Table 45.

3.1.2
long distance unit
heavy rail unit designed for services other than regional, commuter and suburban

Note 1 to entry: The intention is to accord with Commission Regulation 1299/2014 Table 45.

3.1.3
other unit
heavy rail unit which is neither a high speed unit nor a long distance unit

Note 1 to entry: The intention is to accord with Commission Regulation 1299/2014 Table 45.

3.1.4
unit
generic term used to name the rolling stock; a unit may be composed of several vehicles

Note 1 to entry: This definition is derived from Commission Regulation 1302/2014.

3.1.5
vehicle
railway vehicle that runs on its own wheels on railway lines, with or without traction

Note 1 to entry: This definition is derived from Directive 2016/797/EC.

3.1.6
passenger area
area designed for passenger use

3.1.7
service area
area intended to be occupied by service personnel only

3.1.8
seating area
passenger area intended for seated persons, including wheelchair spaces

3.1.9
standing area
unobstructed part of a passenger area which can be used by standing persons or standing persons at the location of tip-up seats

Note 1 to entry: This definition is derived from EN 15663:2017+A1:2018.

3.1.10
open gangway
wide gangway designed to be occupied by passengers

3.1.11
gangway
gangway that is only used to pass from one vehicle to another

3.1.12
vestibule
area between the exterior door(s) and the passenger area designed for access and egress from the vehicle

Note 1 to entry: In the case of high-speed units, the vestibule is not designed to accommodate passengers.

3.1.13
vehicle access step
first fixed part of the floor threshold inside the vehicle

3.1.14
lamp
light source used for the creation of light in a luminaire

Note 1 to entry: Lamps include tungsten, halogen, fluorescent, electroluminescent, LED, OLED and laser diode technologies.

3.1.15
luminaire
complete assembly with associated fixings, fittings and electrical connections for the control of light delivery, excluding the lamp or lamps

Note 1 to entry: A more detailed definition is given in EN 12665, and the ILV item 17–707.

3.1.16
luminance
L
luminous intensity of the light emitted in a given direction from an element of a surface, divided by the area of the element projected in the same direction

Note 1 to entry: Unit: candela per square metre (cd/m^2).

Note 2 to entry: A more detailed definition is given in EN 12665, and the ILV item 17–711.

3.1.17
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)

Note 1 to entry: Unit: lumen (lm).

Note 2 to entry: It is the light power emitted by a source.

Note 3 to entry: Adapted from EN 12665.

3.1.18
Illuminance
E
ratio of the luminous flux incident on a surface to the area of the illuminated surface

Note 1 to entry: Unit: lux (lx) = lm/m².

Note 2 to entry: Illuminance was previously known as the illumination level or value.

Note 3 to entry: The orientation of the surface may be defined, e.g. horizontal, vertical.

3.1.19
average illuminance
E_{av}
illuminance averaged over the specified surface

Note 1 to entry: Unit: lux (lx).

Note 2 to entry: Adapted from EN 12665.

Note 3 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.

3.1.20
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.

3.1.21
correlated colour temperature
T_{cp}
CCT
temperature of the Planckian radiator whose perceived colour most closely resembles that of the given stimulus at the same brightness and under specified viewing conditions

Note 1 to entry: Unit: Kelvin (K).

Note 2 to entry: Adapted from EN 12665.

Note 3 to entry: A more detailed definition is given in ILV item 17–258.

3.1.22
SDCM
standard deviation colour matching
deviation, defined in terms of just perceptible colour differences using 'MacAdam ellipses' as defined in the CIE 1964 colour space

Note 1 to entry: The SDCM scale, runs from 0 to 10, where 1–3 normally covers environments with high demands on colour matching.

Note 2 to entry: The CIE 1964 colour space, also known as CIEUVW, permits analysis of colour difference using the SDCM method.

3.1.23
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 60050-845:1987/AMD1:2016.

3.1.24
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 60050-845:1987/AMD1:2016.

3.1.25
unified glare rating
CIE discomfort glare measure

3.1.26
contractor
organizations responsible for

— the design, manufacture or supply of the lighting system (may also be referred to as the 'supplier'); and

— the purchase, installation or use of the lighting system (may also be referred to as the 'customer')

3.2 Types of lighting

3.2.1
general lighting
lighting of an interior provided for normal operation

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 heavy rail 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 shall achieve the values set out in Table 1 or Table 2.

Where agreed between contractors, it is permissible 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.

General lighting shall be provided in normal operation without interruption.

For high speed and long distance[2] units, in the event of loss of the main power supply, general lighting shall be provided for a period of not less than 10 min.

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 heavy rail systems according to the service and/or location. Two classes of vehicles are defined: (a) high speed and long distance units and (b) other units.

a) For high speed and long distance units, the minimum value of the average illuminance and uniformity requirements shall be in accordance with Table 1.

b) For other units, the minimum value of the average illuminance and uniformity requirements shall be in accordance with Table 2.

c) By agreement between contractors, the requirements for high speed and long distance units may be applied to other units.

[2] This concept is taken from Commission Regulation 1302/2014 Clause 4.2.2.10 (2)