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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 23299-1

Railway applications — Interior electrical lighting for passenger rolling stock —

Part 1: Main line

*Applications ferroviaires — Éclairage électrique intérieur pour
matériel roulant voyageur —*

Partie 1: Grandes lignes

ICS: 45.060.01

ISO/TC 269/SC 2

Secretariat: **AFNOR**

Voting begins on:
2025-12-04

Voting terminates on:
2026-02-26

This document is circulated as received from the committee secretariat.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 269 Railway applications, Subcommittee SC 2 Rolling stock.

A list of all parts in the ISO 23299 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This Document provides comprehensive requirements for electrical interior lighting in passenger rolling stock used for main line railway.

The primary objective is to ensure optimum visibility, safety, and comfort for both passengers and staff. This document sets out detailed criteria for illuminance, illuminance uniformity, colour temperature and colour rendering, limitation of glare and flicker as well as photobiological safety, taking into account the specific operating conditions and constraints inherent to railway transportation. Additionally, it covers the methods for verifying these requirements through testing by simulation or measurement.

It provides a robust framework for operators, railway vehicle manufacturers and lighting system suppliers to implement high-quality lighting solutions that enhance the overall travel experience and work environment.

A related Document, ISO 23299-2, addresses interior lighting requirements for urban guided transport.

Railway applications — Interior electrical lighting for passenger rolling stock —

Part 1: Main line

1 Scope

This document contains performance requirements and recommendations for electrical lighting systems in the interiors of conventional main line passenger railway vehicles, under all operating and emergency conditions.

This document includes requirements for lighting installed for effect purposes (also referred to as decorative lighting).

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

This document includes options for verification via modelling (also referred to as simulation).

This document applies only to new units.

This document does not apply retrospectively to existing railway vehicles for reasons of refurbishment or renewal unless stated otherwise in the Technical Specification.

This document does not address lighting installed in instruments or control devices (for example backlit buttons).

This document does not address requirements for the lighting of boarding aids, for example, moveable steps, bridging plates, or lifts.

This document does not address indicator lights (for example access door indicators, which are addressed in other Standards).

This document does not address requirements for display screens.

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.

ISO/CIE 8995-1:2025, *Light and lighting — Lighting of work places — Part 1: Indoor*

ISO/CIE 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO/FDIS 22575, *Railway applications — General vocabulary*

IEC 61373, *Railway applications - Rolling stock equipment - Shock and vibration tests*

IEC 62471-7, *Photobiological safety of lamps and lamp systems - Part 7: Light sources and luminaires primarily emitting visible radiation*

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 <http://www.iso.org/obp>

3.1 General

3.1.1

railway system

railway

system of infrastructure, related rolling stock, and associated operation

[SOURCE: ISO/FDIS 22575]

3.1.2

conventional railway system

railway system in which rolling stock is supported and guided by steel wheels on a pair of steel rails, located beneath the rolling stock, regardless of their design speed and track gauge

[SOURCE: ISO/FDIS 22575]

3.1.3

unit

assembly of one or more railway vehicles

[SOURCE: ISO/FDIS 22575]

3.1.4

railway vehicle

individual element of a means of transport mechanically or magnetically guided and supported by track

[SOURCE: ISO/FDIS 22575]

3.1.5

rolling stock

railway vehicles covering all types of, or any formation of railway vehicles

[SOURCE: ISO/FDIS 22575]

3.1.6

high-speed unit

main line railway unit designed to operate at speeds equal to or greater than 250 km/h

3.1.7

intercity unit

main line railway unit designed for long-distance travel between major cities with limited stops along their route

3.1.8

unit for night service

main line railway unit designed to accommodate sleeping passengers on overnight or multi-day journeys

3.1.9

passenger area

area designed for passenger use

3.1.10

service area

area intended to be occupied by service personnel only

3.1.11

seating area

passenger area intended for seated persons, including wheelchair spaces

3.1.12

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

[SOURCE: EN 15663:2017 [\[1\]](#)]

3.1.13

gangway

diaphragm

flexible assembly between adjacent railway vehicles designed to allow transit from one railway vehicle to another

[SOURCE: EN 16286-1:2024 [\[2\]](#)]

3.1.14

open gangway

wide gangway designed to be occupied by passengers

3.1.15

vestibule

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

Note 1 to entry: In some railway vehicles, the vestibule may not be designed to accommodate passengers.

3.1.16

railway vehicle access step

first fixed part of the floor threshold inside the railway vehicle

3.1.17

aisle

a path through a railway vehicle, which is not bordered by walls

EXAMPLE down the centre of a coach with a row of seats on each side

3.1.18

side corridor

passageway

a path through a railway vehicle to allow a passenger or crew to move from one location to another which is bordered by walls

3.1.19

driver's cab

compartment of a railway vehicle which is equipped with controls and instruments with which the driver controls the train

[SOURCE: ISO/FDIS 22575]

3.1.20

technical specification

project specification

document that defines the technical requirements, performance criteria, and verification methods for the railway vehicle, the lighting system, a subsystem or components thereof, typically prepared by the organisation specifying the railway vehicle, the lighting system or its components, and used as a contractual basis for design, procurement, and conformance assessment

Note 1 to entry: For the purpose of this Document, technical specification is defined differently from ISO/IEC Directives, Part 2, subclause 3.1.5.

3.2 Optical terms

3.2.1

electric light source

primary light source with the means for connecting to the power supply and usually designed to be incorporated into a luminaire

EXAMPLE Examples of electric light source include: electric lamp, LED module and OLED module

[SOURCE: ILV 17-27-004]

3.2.2

luminaire

apparatus which distributes, filters or transforms the light transmitted from at least one source of optical radiation and which includes, except the sources themselves, all the parts necessary for fixing and protecting the sources and, where necessary, circuit auxiliaries together with the means for connecting them to the power supply

[SOURCE: ILV 17-30-001]

3.2.3

optical axis

<of a luminaire> axis defined by the manufacturer, against which the luminous intensity requirements are defined and assessed

3.2.4

luminance

L

density of luminous intensity with respect to projected area in a specified direction at a specified point on a real or imaginary surface

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

[SOURCE: ILV 17-21-050]

3.2.5

luminous flux

Φ

change in luminous energy with time

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

Note 2 to entry: Further information on the term luminous energy may be found in ILV 17-21-037.

[SOURCE: ILV 17-21-039]

3.2.6

Illuminance

E

density of incident luminous flux with respect to area at a point on a real or imaginary surface

Note 1 to entry: Unit: lux (lx)

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.

[SOURCE: ILV 17-21-060]

3.2.7

average illuminance

E_{av}

illuminance averaged over the specified surface

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

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.

[SOURCE: ILV 17-29-155]

3.2.8

illuminance uniformity

set of quotients of the illuminances at each measuring location and the average illuminance on a specified measurement surface

Note 1 to entry: To demonstrate compliance with the illuminance uniformity ranges set out in this Document, it is sufficient to evaluate the minimum and maximum illuminance among those measured at all measuring locations at a specific surface to obtain the extremes of this set.

[SOURCE: ILV 17-29-160, with modifications: "quotient of minimum illuminance" replaced with "set of quotients of the illuminances at each measuring location" and "on a surface" replaced with "on a specified measurement surface"]

3.2.9

correlated colour temperature

CCT

T_{cp}

temperature of a Planckian radiator having the chromaticity nearest the chromaticity associated with the given spectral distribution on a modified 1976 UCS diagram where u' , $2/3 v'$ are the coordinates of the Planckian locus and the test stimulus

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

Note 2 to entry: Correlated colour temperature refers to the temperature of an ideal black-body radiator whose colour appearance most closely matches that of a given light source under specified viewing conditions.

[SOURCE: ILV 17-23-068]

3.2.10

SDCM

standard deviation colour matching

deviation, defined in terms of just perceptible colour differences using 'MacAdam ellipses'

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 permits analysis of colour difference using the SDCM method; 'MacAdam ellipses' are defined in the CIE 1964 colour space as defined in ISO/CIE 11664-1.

Note 3 to entry: The concept of MacAdam Ellipses was introduced in the Journal of Optical Society of America, 33-1, 1943, pp 18-26^[3]

3.2.11

colour rendering

effect of an illuminant on the perceived colour of objects by conscious or subconscious comparison with their perceived colour under a reference illuminant

[SOURCE: ILV 17-22-107]

3.2.12

colour rendering index

CRI

measure of the degree to which the psychophysical colour of an object illuminated by the test illuminant conforms to that of the same object illuminated by the reference illuminant, suitable allowance having been made for the state of chromatic adaptation

Note 1 to entry: See also CIE 13 ^[4].

[SOURCE: ILV 17-22-109]

3.2.13

maintenance factor

quotient of illuminance produced by the lighting installation after a certain time interval and the illuminance produced by the installation when new

[SOURCE: ILV 17-29-146]

3.2.14

glare

condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or by extreme luminance contrasts

[SOURCE: ILV 17-22-098]

3.2.15

flicker

perception of visual unsteadiness induced by a light stimulus the luminance or spectral distribution of which fluctuates with time, for a static observer in a static environment

Note 1 to entry: The fluctuations of the light stimulus with time include periodic and non-periodic fluctuations and can be induced by the light source itself, the power source or other influencing factors.

[SOURCE: ILV 17-22-092]

3.3 Types of lighting

3.3.1

general lighting

lighting of an interior provided for normal operation

Note 1 to entry: The meaning in this Document is different from ILV 17-29-007

3.3.2

stand-by lighting

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

Note 1 to entry: Stand-by lighting may be used e.g. to extend the period during which lighting levels above emergency lighting levels can be maintained by preserving energy when railway vehicle power supply (e.g., catenary or third rail) becomes unavailable.