SLOVENSKI STANDARD
SIST EN 16186-4:2019

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Železniške naprave - Voznikova kabina - 4. del: Postavitev in dostop

Railway applications - Driver's cab - Part 4: Layout and access

Bahnanwendungen - Führerraum - Teil 4: Gestaltung und Zugang

Applications ferroviaires - Cabine de conduite - Partie 4 : Aménagement et accès

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ICS:

45.060.10 Vlečna vozila Tractive stock

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English Version

Railway applications - Driver's cab - Part 4: Layout and access

Applications ferroviaires - Cabine de conduite - Partie 4 : Aménagement et accès

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European foreword

This document (EN 16186-4:2019) 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of an identical text or by endorsement, at the latest by November 2019, and conflicting national standards shall be withdrawn at the latest by November 2019.

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 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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

EN 16186, *Railway applications — Driver’s cab*, consists of the following parts:

— *Part 1: Anthropometric data and visibility*;

— *Part 2: Integration of displays, controls and indicators*;

— *Part 3: Design of displays*;

— *Part 4: Layout and access*;

— *Part 5: External visibility for tram vehicles*[1];

— *Part 6: Working environment in tram vehicles*[1];

— *Part 8: Tram vehicle layout and access*[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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[1] Under development.

Introduction

This part of the EN 16186 series addresses design rules and requirements for the layout and design of the driver's cab considering operational requirements for train driving, shunting and related preparatory work as far as driver's cab interfaces are concerned. It provides current cab design principles and considers latest available research findings provided by the European Research project EUDD+ [36].

If a requirement contains an option, the choice of this option is purely up to the applicant.

1 Scope

This document gives design rules and requirements in order to ensure proper access, lighting, seating and exit of the driver's cab. The different dimensions are based on the anthropometric data defined in EN 16186-1. The corresponding assessment methods are also included in this standard. It covers the following aspects:

— dimension and interior layout;

— door access, steps, floor characteristics;

— seats dimension and clearance;

— interior cab lighting;

— emergency exit;

— marking and labelling.

This part of the EN 16186 series applies to driver's cabs of Electrical Multiple Unit (EMU), Diesel Multiple Unit (DMU), Railcars, Locomotives and Driving trailers (Driving Coaches).

NOTE 1 This European Standard applies to rolling stock in the scope of Directive 2008/57/EC [6].

This part of the EN 16186 series applies to driver's desks installed on the left, on the right, or in a central position in the driver's cab. Due to cab space and resulting desk integration constraints, desk layout can vary.

NOTE 2 Due to railway systems constraints, the level of comfort and accessibility provided to the persons outside the anthropometric range defined in EN 16186-1 may vary. Usually the operators manage the potential restrictions, if the driver uses the full range of seat positions (as defined in this standard) combined with extreme body dimensions (as defined in EN 16186-1).

This document is not intended to be applicable for OTMs, tramways, metro and light rail vehicles.

NOTE 3 For OTMs, see EN 14033-1 [11] and EN 15746-1 [17].

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.

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 1005-3, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 12663-1, *Railway applications — Structural requirements of railway vehicle bodies — Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)*

EN 14752:2015, *Railway applications — Body side entrance systems for rolling stock*

EN 15152, *Railway applications — Front windscreens for train cabs*

EN 15227, *Railway applications — Crashworthiness requirements for railway vehicle bodies*

EN 15273 (all parts), *Railway applications — Gauges*

EN 16116-1, *Railway applications — Design requirements for steps, handrails and associated access for staff — Part 1: Passenger vehicles, luggage vans and locomotives*

CEN/TS 16165, *Determination of slip resistance of pedestrian surfaces — Methods of evaluation*

EN 16186-1:2014+A1:2018, *Railway applications — Driver's cab — Part 1: Anthropometric data and visibility*

EN 16186 (all parts), *Railway applications — Driver's cab*

EN 45545-2, *Railway applications — Fire protection on railway vehicles — Part 2: Requirements for fire behaviour of materials and components*

EN 45545-4:2013, *Railway applications — Fire protection on railway vehicles — Part 4: Fire safety requirements for rolling stock design*

EN ISO 2813:2014, *Paints and varnishes — Determination of gloss value at 20°, 60° and 85° (ISO 2813:2014)*

EN ISO 3385, *Flexible cellular polymeric materials — Determination of fatigue by constant-load pounding (ISO 3385)*

EN ISO 7010:2012, *Graphical symbols — Safety colours and safety signs — Registered safety signs (ISO 7010:2011)*

ISO 2631-1, *Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 7001:2007, *Graphical symbols — Public information symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the EN 16186 series and the following 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
driver's working area
driver's cab area where unauthorized people are not allowed to enter

Note 1 to entry: The rear limit of the driver's working area is defined in Figure B.1.

3.2
passage width
minimum clear usable width

Note 1 to entry: See EN 14752:2015, Figure 1.

3.3
gloss
optical property of a surface, characterized by its ability to reflect light specularly

[SOURCE: EN ISO 2813:2014, 3.1, modified — Note 1 to entry has been deleted.]

4 Symbols and abbreviations

For the purposes of this document, the following abbreviations are used.

CR	Conventional Rail
CCS	Control Command and Signalling
DMU	Diesel Multiple Unit
EMU	Electric Multiple Unit
ETCS	European Train Control System
g	Standard acceleration due to gravity (9,81 m/s²)
HP	Heel Point
GU	Gloss Unit
OTM	On-Track Machine
RAL	Colour codification from Deutsches Institut für Gütesicherung und Kennzeichnung, former Reichs-Ausschuss für Lieferbedingungen
SRP	Seat Reference Point

5 Driver's cab access and egress

5.1 Access, egress and doors

5.1.1 General

5.1.1.1 Access and security

Access to the driver’s cab shall be from the exterior via a direct external door, or through an adjacent compartment or area behind the cab.

These doors shall be designed to have an operational envelope that does not conflict with the envelope of another cab access door.

The driver's cab and its access shall be designed so that the train crew is able to prevent the cab being accessed by non-authorized persons, whether the cab is occupied or not. This requirement is deemed to be fulfilled by a locking system.

A cab door locking system shall permit to open any cab door from inside the cab without using any tool or key.

Egress and access to the driver's cab shall be possible without any energy supply.

5.1.1.2 Door handles

Driver's cab internal door handles which are intended to be operated from a standing position shall be located at a height between 820 mm and 1 200 mm (distance between the rotation point of the handle and the cab floor). The recommended value for the height of the door handles is 850 mm.

5.1.1.3 Threshold

The height of door threshold shall not be more than:

— 20 mm from the walkable floor for interior doors excluding locomotives;

— 70 mm from the walkable floor for interior doors of locomotives;

— 60 mm from the walkable floor for exterior doors.

5.1.1.4 Ergonomics

For interior handles in regular use at least 40 mm clearance to surrounding surfaces shall be provided. For exterior handles see EN 16116-1.

5.1.2 External doors

External doors and hand holds shall be designed in accordance with EN 16116-1.

External cab doors when opened shall not infringe the intended maximal construction gauge defined from gauge rules of the vehicle (see the EN 15273 series).

If cab side door is of a hinged type, it shall be designed to open towards the interior of the cab. This recommendation does not apply to shunting locomotives or locomotives with central cab and EMU/DMU where sliding or plug doors are used.

Driver's cab external doors shall have a rectangular-like shape with a minimum unobstructed passage height and minimum passage width of:

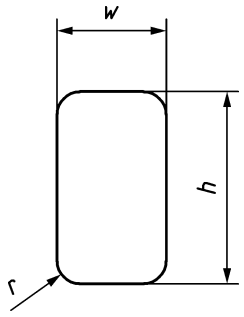
— 1 675 mm × 500 mm when accessible from outside by foot-steps, or;

— 1 750 mm × 500 mm when accessible from outside on floor level (without foot-steps, e.g. central cab external door with inside floor and outside gangway on the same level);

— 1 675 × 430 mm for central cab locomotives when accessible from outside by foot-steps, in accordance with Figure B.2;

— 1 750 mm × 430 mm for central cab locomotives (without foot-steps), in accordance with Figure B.2.

Driver's cab external doors should have a rectangular-like shape with a minimum unobstructed passage of 1 950 mm (height) × 600 mm (width) in accordance with Figure 1.



Key

w width

h height

r radius

Figure 1 — Minimum unobstructed passage dimensions

Dimension *r* shall have a maximum value of 20 % of the width.

Driver's cab front facing external doors which are positioned left or right of the vehicle's longitudinal axis and open in longitudinal direction may have a trapezium shaped upper area with an angle of the top outer side. In order to achieve a maximum passage width in the angled upper area of the door, the maximal construction gauge shall be used to its full extent. This reduction due to the gauge calculation shall keep a minimum clearance width of 280 mm in the upper area (see Figure B.2).

Cab external doors shall not open unintentionally. External cab doors should have at least two stable positions: fully open and closed.

5.1.3 Internal doors giving access to the driver's cab

If internal doors lead directly to the passenger area, a device to look from inside the cab shall be provided, (e.g. by a spy hole).

If direct view from passenger area into cab is possible, the driver should be able to prevent such view, e.g. by blinds.

Internal doors shall have a rectangular-like minimum unobstructed passage height and passage width of 1 700 mm × 430 mm. Internal doors should have a rectangular-like minimum unobstructed passage height and passage width of 1 950 mm (height) × 600 mm (width).

Internal doors which are positioned left or right of the vehicle's longitudinal axis and open in longitudinal direction may have a trapezium shaped upper area with an angle of the top outer side (see Figure B.3). In order to achieve a maximum passage width in the angled upper area of the door, the maximal construction gauge shall be used as a common basis. This reduction due to the gauge calculation shall keep a minimum clearance width of 280 mm in the upper area.

5.2 Floor and flooring

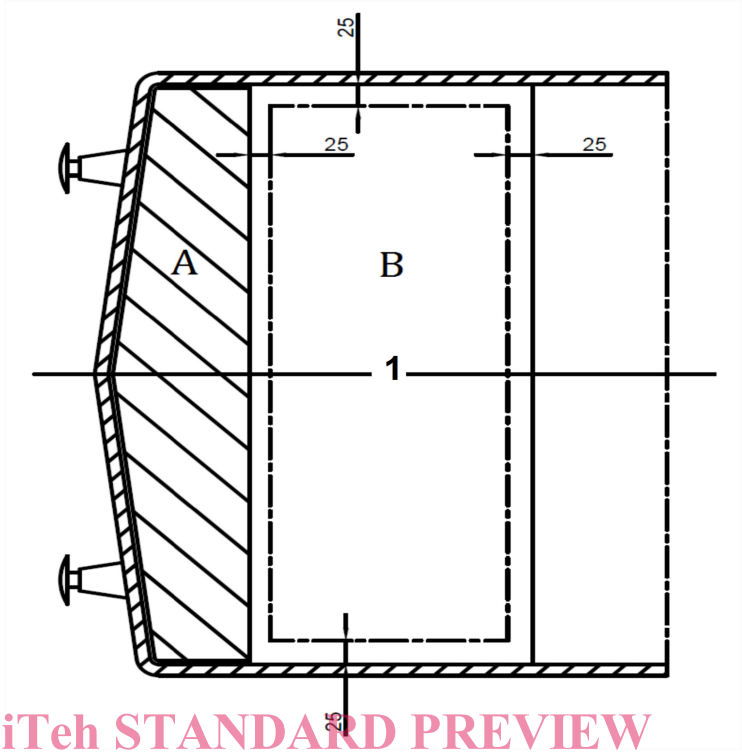
5.2.1 Floor surface criteria

Walkable floor surfaces shall be slip resistant.

This is deemed to be fulfilled by applying the requirements of CEN/TS 16165, $\alpha_{shod} \geq 9°$.

For minimizing the tripping hazard, the walkable floor of the cab, except for the area up to a maximum of 25 mm from the walls and for the space under the desk, shall be level (see Figure 2).

Dimensions in millimetres



Key

1 Level

A Under desk area

B Walkable floor

Figure 2 — Walkable floor: admissible irregularities

This is deemed to be fulfilled by the following criteria:

— on a level track, the walkable floor shall be horizontal with a tolerance of ± 2° except for the walkable floor areas determined to changes of height, and;

— no irregularity on the walkable floor shall protrude by more than 5 mm.

Door thresholds and foot operated operational elements are not considered as being a floor irregularity.

No deflection of more than 10 mm shall be permitted in the walkable floor, over an area of 5 000 cm², due to an applied load of 1 300 N on a surface of maximum 600 cm². This can be demonstrated by calculation or by test.

NOTE No reference to EN 15663 is given, because the load is associated to the stiffness of the floor and not to the load calculation for the vehicle.

5.2.2 Inclination, steps and slopes

The walkable floor of the driver's working area (access to the cab and foot rest excluded) shall be without any steps. Height changes > 4 mm per 100 mm length are not permitted on the walkable cab floor of the driver's working area. They are permitted between the cab and adjacent compartments.

Height changes of interior walkable floors between the cab and adjacent compartments ≤ 60 mm shall be achieved by a sloping walkable floor. Height changes > 60 mm and < 120 mm should be avoided.