
Železniške naprave - Voznikova kabina - 6. del: Združevanje slikovnih zaslonov ter krmilnih in prikazovalnih elementov za tramvajska vozila

Railway applications - Driver's cab - Part 6: Integration of displays, controls and indicators for tram vehicles

Bahnanwendungen - Führerraum - Teil 6: Integration von Displays, Bedien- und Anzeigeelementen für Straßenbahnfahrzeuge

Applications ferroviaires - Cabine de conduite - Partie 6 : Intégration des afficheurs, commandes et indicateurs pour tramways

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indicateurs pour tramways

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von Displays, Bedien- und Anzeigeelementen bei
Straßenbahnfahrzeugen

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European foreword

This document (EN 16186-6:2024) 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of an identical text or by endorsement, at the latest by April 2025, and conflicting national standards shall be withdrawn at the latest by April 2025.

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.

EN 16186, Railway applications — Driver's cab is written as an EN series on all the aspects to be considered when designing a driver's cab, from anthropometric data and visibility, over the integration of displays, controls and indicators as well as the design of displays to cab layout and access facilities. The background information on the anthropometric data used is provided in CEN/TR 16823 [1].

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

- *Part 1: Anthropometric data and visibility;*
- *Part 2: Integration of displays, controls and indicators;*
- *Part 3: Design of displays for heavy rail vehicles;*
- *Part 4: Layout and access;*
- *Part 5: External visibility for tram vehicles;*
- *Part 6: Integration of displays, controls and indicators for tram vehicles;*
- *Part 7: Design of displays for tram vehicles*¹⁾;
- *Part 8: Layout and access for tram vehicles.*

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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, Türkiye and the United Kingdom.

¹⁾ Under preparation. Stage at the time of publication: prEN 16186-7.

Introduction

This document addresses the operating and perception requirements of controls and displays elements in tram vehicles driver cabs. It provides current cab design principles.

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EN 16186-6:2024 (E)**1 Scope**

This document is applicable to vehicles operating on tram networks.

This document gives design requirements and guidance in order to ensure visibility and operability of displays, controls and indicators in the cab in all operating conditions (day, night, natural or artificial lighting).

It covers four aspects:

- the characteristics of the displays, controls and indicators in order to ensure proper visibility: i.e. range of luminance and contrast as well as the possibility of adjustment of perceived brightness;
- the requirements for the location of the displays, keyboards, controls and indicators in the cab and on the driver's desk: i.e. position, angle of visibility, etc. with consideration of the normal driving position and the working environment (windscreen, natural or artificial lighting in the cab, unwanted glare and reflections, etc.);
- the characteristics and requirements for the location of microphones and loudspeakers;
- design of symbols.

NOTE All element numbers within the text refer to Table B.1.

This document does not apply to refurbishment of existing vehicles. This document is not intended to be applicable to driver's auxiliary desk, except for 5.3.13, Clause 6, 7.1.2, Clause 9 and Table B.1.

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 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 13272-2, *Railway applications — Electrical lighting for rolling stock in public transport systems — Part 2: Urban rail*

EN 14752, *Railway applications — Bodyside entrance systems for rolling stock*

EN 15227, *Railway applications — Crashworthiness requirements for rail vehicles*

EN 16186-5, *Railway applications — Driver's cab — Part 5: External visibility for tram vehicles*

EN 16186-8, *Railway applications — Driver's cab — Part 8: Tram vehicle layout and access*

EN 17355, *Railway applications — Communication device for urban rail — System requirements*

EN ISO 15008:2017, *Road vehicles — Ergonomic aspects of transport information and control systems — Specifications and test procedures for in-vehicle visual presentation (ISO 15008:2017)*

ISO 3381, *Railway applications — Acoustics — Noise measurement inside railbound vehicles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16186-5, EN 16186-8 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

alarm

audible and/or visual warning requiring immediate action, with a defined priority

3.2

cab lighting

lighting that illuminates the driver's cab

3.3

contrast

perception of a difference visually between one surface or element of a rail vehicle and another by reference to their light reflectance values (LRV) or luminance values

Note 1 to entry: See BS 8300:2009+A1:2010 for further information.

[SOURCE: EN 16584-1:2017, 3.3, modified "building/" has been removed]]

3.4

control

device used to determine the behaviour or supervise the running of equipment

3.5

display

hardware device or system that shows text and/or graphic information and/or video to the user

Note 1 to entry: The display can have input device(s), for example a keyboard or a touchscreen.

3.6

monitor

apparatus for displaying video images

3.7

driver multifunctional interface

DMI

hardware including at least a display and an input device (e.g. keyboard)

3.8

emergency braking

application of a pre-defined brake force that, whilst taking into consideration the usable brake equipment types, achieves the specified emergency braking performance and level of safety

Note 1 to entry: The braking performance and safety level of the emergency braking are typically equal to or superior to that of the maximum service brake, assuming the demanded wheel-rail adhesion, etc. is available, and is described in EN 13452-1.

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[SOURCE: EN 14478:2017, 4.8.1, modified – “vehicle specific EN standards” is replaced with “EN 13452-1”]

3.9**indicator**

element designed to indicate the system status

3.10**instrument lighting**

lighting that illuminates specific gauges to make their scales visible

3.11**operation aided system display**

display that allows the driver to enter operational related information and to get real time information

EXAMPLES Route information, electronic timetable, messages from the control centre.

3.12**position-dependent control**

control whose command is proportional to the position of its operating part

EXAMPLE Master controller, defining a specific traction value/deceleration level depending on the position.

3.13**time-dependent control**

control whose command is proportional to the duration of the application of the operating part of the device in a specific position

EXAMPLE Speed increase button on the automatic speed control.

3.14**RAL xxxx**

colour codification by the German Institute for Quality Assurance and Certification, former Reichs-Ausschuss für Lieferbedingungen

Note 1 to entry: RAL 3020 is the coding for traffic red.

3.15**safety braking**

braking intended to achieve a higher level of system integrity than that achieved when service and emergency braking

Note 1 to entry: The safety braking performance can be lower than achieved by full service braking or emergency braking. The performances are described in EN 13452-1.

[SOURCE: EN 14478:2017, 4.8.4, modified — “specific to mass-transit brake systems” deleted and “when” replaced by “by” in the note and “The performances are described in EN 13452-1” added]

3.16**warning**

visual and/or audible indication triggered by an event of which the recipient needs to be aware and which may not require immediate action

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

ATP	Automatic Train Protection
CCD	Control Command Display
DAC	Driver Activity Control
DMI	Driver Multifunctional Interface
ETD	Electronic Timetable Display
HVAC	Heating, Ventilation and Air Conditioning
OCC	Operations Control Centre
OASD	Operation Aided System Display
PACM	Pedestrian Anti-Crush Mechanism
PEMD	Passenger Exchange Monitoring Display
PIS	Passenger Information System
RAL	“Reichs-Ausschuss für Lieferbedingungen” (German Institute for Quality Assurance and Certification)
RVMD	Rear View Monitoring Display
SRP	Seat Reference Point
TDD	Technical and Diagnostic Display
TRD	Train Radio Display

5 Displays, controls and warnings for operational functions

5.1 General

The common elements and symbols are described in Annex B.

In the following text, two-digit numbers refer to Table B.1 that lists all the elements.

Controls and displays shall not impede visibility, as defined in EN 16186-5.

NOTE Additional equipment and additional requirements for tram-train vehicles relating to displays, controls and warnings can be found in EN 16186-2.

If the cab has been activated, the following information shall be available at all times on the main desk:

- brake information:
- 10 – Release of continuously applied emergency brake;
- 04 – Operation Aided System Display (if provided).

If the cab is not activated, information may only be displayed on request.

5.2 Displays for communication, monitoring and control

Vehicle monitoring and vehicle control shall be provided, as a minimum, by 01 – Technical and Diagnostic Display (TDD) and 05 – Speedometer. Additional displays can be provided, for example:

- 02 – Passenger exchange monitoring display (PEMD);

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- 03 – Rear view monitoring display (RVMD);
- 04 – Operation aided system display (OASD).

NOTE A monitoring display can be a monitor.

For tram-train vehicles, if other displays are added, the forward visibility according to EN 16186-1 and EN 16186-5 shall not be impeded.

5.3 Controls**5.3.1 Driver's master controller**

The “tractive effort” shall increase by pushing the lever forward, and the “braking effort” shall increase by drawing the lever towards the driver. For an emergency braking position, there shall be a notch clearly distinguishable from other positions of the lever.

The tractive or braking effort level shall depend on the position of the lever of 11 – Master controller.

11 – Master controller shall be position-dependent.

NOTE The different emergency braking modes are described in EN 13452-1:2003, 3.2.3.

5.3.2 Control for driver activity

There shall be at least one 17 – Driver's activity control element for the DAC function.

NOTE 1 DAC is also called “Deadman”.

NOTE 2 This function can be integrated in the master controller.

5.3.3 Control for running direction selection

There shall be a control for the selection of direction of running: 18 – Direction of running (forwards/backwards).

The direction selected shall be indicated.

5.3.4 Controls for external lights

Controls for 36 – Dipped lights - main beam lights switching (head), 38 – External lights (head, tail), 39 – Hazard warning lights and 40 – Direction indicators shall control all external lights of the vehicle.

Activated external lights shall be indicated.

If a fog lamp is available, 33 – Fog lamp control shall be provided.

5.3.5 Controls for Intercom

If there is no device to communicate with the control centre, the driver's cab shall have a communication device in accordance with EN 17355:

- 49 – A device (e.g. microphone, loudspeaker) to support the communication function;
- 50 – A signal for the communication request to the driver;
- 50 – A device for acknowledging the request for communication;
- 50 – A control to establish the communication link to the operated device;
- 50 – A control to cancel the communication link to the operated device.