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Interested committees:

Title: BS EN 14752 Railway applications - Bodyside entrance systems for rolling stock

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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.

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Date: xx/xx/20xx	Document: ISO/DIS xxxx

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex **(e.g. 3.1)**	Paragraph/Figure/ Table/Note	**Type of comment**	**Commend (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.	

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 14752

February 2024

ICS 45.140

Will supersede EN 14752:2019+A1:2021

English Version

Railway applications - Bodyside entrance systems for rolling stock

Applications ferroviaires - Systèmes de porte d'accès pour matérial roulant

Bahnanwendungen - Seiteneinstiegssysteme für Schienenfahrzeuge

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If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European foreword

This document (prEN 14752:2024) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14752:2019+A1:2021.

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Introduction

This document specifies the minimum requirements for construction and operation of railway passenger access systems and covers:

— safe access and egress from passenger trains through body side doors and steps;

— usability for persons with reduced mobility;

— a minimum risk of injury to persons as a result of door and step operation;

— that the doors and moveable steps, ramps, bridging plates remain closed when the vehicle is in motion; and

— safe maintenance of the entrance systems.

Where passenger bodyside entrance doors are to be used for staff access EN 16116-1:2022 provides the details for the staff access requirements.

Statutory legal obligations to minimize operational safety risks to ensure staff and passenger safety for the intended door system may require enhancement to the minimum requirement's detailed in this standard. Annex G stipulates clauses that are to be clarified and possibly enhanced within a technical specification when referring to this standard for the intended passenger service operation of the door system.

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1 Scope

This document applies to passenger body side entrance systems of all newly designed railway vehicles such as tram, metro, suburban, main-line and high-speed trains that carry passengers. The requirements of this document also apply to existing vehicles undergoing refurbishment of the door equipment, as far as it is reasonably practicable.

This document also specifies the requirements for testing of entrance systems.

This document makes reference to manual and power operated entrance systems. For manual doors, clauses referring to power operation are not applicable.

This document does not apply to the following:

— entrance systems for equipment access, inspection or maintenance purposes and for crew only use;

— doors on freight wagons; and

— doors or hatches specifically provided for escape under emergency conditions.

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

EN 13032-1:2004+A1:2012, *Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 1: Measurement and file format*

EN 13272 (all parts), *Railway applications — Electrical lighting for rolling stock in public transport systems*

EN 14067 (all parts), *Railway applications — Aerodynamics*

EN 16116-1:2022, *Railway applications - Design requirements for steps, handrails and associated access for staff - Part 1: Passenger vehicles, vans and locomotives*

EN 17285:2020, *Railway applications - Acoustics - Measuring of door audible warnings*

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

EN 50121-3-2, *Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus*

EN 50125-1, *Railway applications - Environmental conditions for equipment - Part 1: Rolling stock and on-board equipment*

EN 50126 (all parts), *Railway applications — The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)*

EN 50153, *Railway applications - Rolling stock - Protective provisions relating to electrical hazards*

EN 50155, *Railway applications — Rolling stock — Electronic equipment*

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EN 50215, *Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service*

EN 50657, *Railways Applications - Rolling stock applications - Software on Board Rolling Stock*

EN 60077-1:2017, *Railway applications — Electric equipment for rolling stock — Part 1: General service conditions and general rules (IEC 60077-1:2017)*

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

EN ISO 10140-2, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

EN ISO 12567-1, *Thermal performance of windows and doors - Determination of thermal transmittance by the hot-box method - Part 1: Complete windows and doors (ISO 12567-1)*

EN°16584-1:2017, *Design for PRM Use -General requirements – Part 1: Contrast*

EN°16584-3:2017, *Design for PRM Use -General requirements – Part 2: Optical and friction characteristics*

EN°16585-1:2017, *Design for PRM Use -Equipment and components onboard rolling stock – Part 1: Toilets*

EN°16586-1:2017, *Design for PRM Use -Accessibility of persons with reduced mobility to rolling stock – Part 1: Steps for access and egress*

EN°16586-2:2022, *Design for PRM Use -Accessibility of persons with reduced mobility to rolling stock – Part 2: Boarding aids*

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
access device
operating element used to unlock a locked door in order to allow for door opening from outside when the door is not available for normal operation

3.2
bridging plate
retractable device integrated into the vehicle as close as possible to the door threshold level that enables access for wheelchair users, fully automatic and activated/controlled in conjunction with the door opening/closing sequences or semi-automatic on demand from passenger or staff

Note 1 to entry: It retains its strength without support on the station platform when extended.

[SOURCE: EN 16586-1:2017, 3.2]

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3.3
central closing
powered closing of the door by remote command without intervention by the passenger

3.4
contrast
perception of a difference visually between one surface or element of a building/rail vehicle and another by reference to their light reflectance values (LRV) or luminance values

[SOURCE: EN 16584-1:2017, 3.6]

3.5
door
body side panel available for passenger access and egress, including its components

3.6
door control devic e
device to initiate door opening or closing command

3.7
door/step out-of-service
door or step which is locked and not available for use

3.8
door/step isolated
door and/or step to which the pneumatic and/or electric power supply is isolated

3.9
door operation
all door operating sequences

3.10
emergency egress device
operating element used to unlock a locked door in order to allow for manual opening of the door from inside in case of an emergency

3.11
entrance system
system to facilitate passenger entrance to vehicles including door, step/ramp/bridging plates and the related drive and control devices

3.12
first step
step that is the first step for a passenger to use, to overcome a height change

Note 1 to entry: For the external access/egress steps this will normally be the step that is closest to the platform edge (fixed or a movable step), therefore this is the first step when boarding and the last step when alighting.

Note 2 to entry: In the context of steps for internal height changes (other than the external access/egress steps) this means the first usable step when ascending and the edge of the walking floor when descending.

[SOURCE: EN 16586-1:2017, 3.6]

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3.13
leading edge
edge of the door, leading during closing movement

3.14
local closing
powered closing by intervention of a person or by a local automatic device

3.15
locked door
closed door held closed by a mechanical device

3.16
manual door
door that is closed or opened exclusively by hand power

3.17
manual ramp
device designed for the passage from one level to another, which is compatible with the vehicle, which is supported on the station platform when extended

Note 1 to entry: Deployment by train crew or platform staff is manual.

Note 2 to entry: The purpose of the manual ramp is to facilitate wheelchair access.

Note 3 to entry: See EN 16586-2 for further details.

3.18
moveable step
retractable device integrated into the vehicle forming a step with the threshold, fully automatic and activated/controlled in conjunction with the door opening/closing sequences to reduce the gap in width and height between vehicle and platform

Note 1 to entry: The moveable step retains its strength without support on the station platform.

3.19
palm operated
operable by the palm or any part of the hand, not requiring fingers to be unclenched

Note 1 to entry: The design need is that passengers with painful conditions, which affect their joints such as arthritis, may be unable to (and are likely to experience discomfort or pain if they do) exert any force with the tip of a single finger. Many may not be able to unclench their fingers to do this or perform any pulling action.

[SOURCE: EN 16585-1:2017, 3.6, modified — The original term was “palm operable”.]

3.20
power operated door system
door system which operates doors in opening and closing direction by machine power

3.21
released door
door in a state in which it may be opened by a member of the public or train crew by operating the door

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3.22
RIC-KEY
key according to the agreement on mutual use of vehicles for persons and goods in international transport (RIC = International coach regulations)

Note 1 to entry: See Annex H.

3.23
routine test
test to which each entrance system equipment is subjected during or after manufacturing or assembly to the vehicle

3.24
semi-automatic ramp
device designed for the passage from one level to another, which is integrated into the vehicle and which is supported on the station platform when extended

Note 1 to entry: Deployment is locally activated and supervised.

Note 2 to entry: The purpose of the semi-automatic ramp is to facilitate wheelchair access.

Note 3 to entry: See EN 16586-2 for further details.

3.25
slip resistant
surface finish that is sufficiently rough or otherwise specially formulated so that friction between the surface and a person's footwear or mobility aid is maintained at an acceptable level in both wet and dry conditions

Note 1 to entry: Snow and ice are outside this definition and this standard, therefore other special measures (e.g. operational) should be taken for steps and platforms, etc. that are exposed to these weather conditions.

[SOURCE: EN 16584-3:2017, 3.5]

3.26
tactile
information that is relayed through the physical sense of touch

Note 1 to entry: Tactile signs, controls, symbols, pictograms, guide path and Braille or raised characters are a physical means by which tactile information is provided

[SOURCE: EN 16584-1:2017, 3.29]

Note 2 to entry: EN 16584-2:2017, Annex J, appertaining to touch

3.27
Technical Specification
document describing specific parameter and/or product requirements as an addition to the requirements of this standard

3.28
train crew
persons authorized to carry out the duties for door operation

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3.29
type test
test of one entrance system and its components to prove that the design meets the standard and the relevant specifications

3.30
unlocked door
door with mechanical door locking released

4 Constructional requirements

4.1 Door design

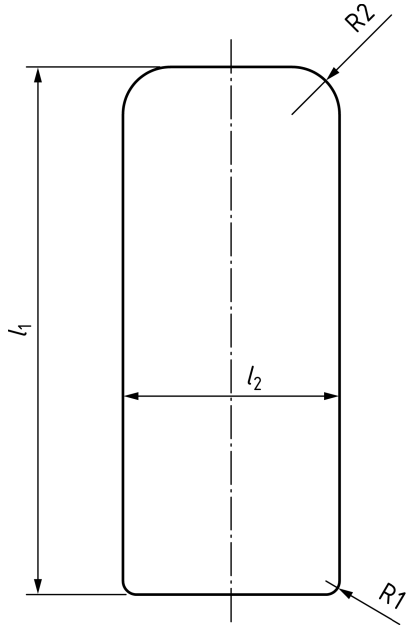
4.1.1 Door throughway design

4.1.1.1 Minimum width

Doors shall have an unrestricted clear usable width (1) of 800 mm minimum to allow unimpeded access and egress of passengers (Figure 2 shows two examples of doors). On trains where there are dedicated wheel chair access doors that door shall have a minimum clear useable width of 1 000 mm when open.

Any interior features shall not encroach into the clear usable width, i.e. interior features or grab handles to aid boarding.

The dimensions for the minimum height and shape are defined by Figure 1



Key

L2: Clear usable width	R2: < = 175 mm
L1: Clearway height	R1: < = 50 mm

Figure 1 — Throughway hight and shape

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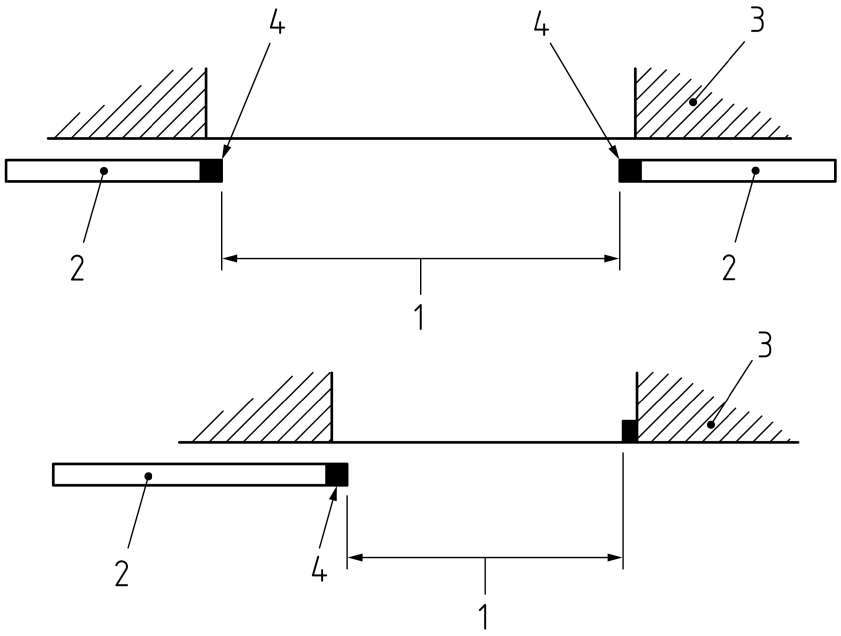

Key

1	Clear usable width	3	Vehicle
2	Door leaf	4	Leading edge

Figure 2 — Minimum width

4.1.1.2 Minimum height

Doors shall have an unrestricted vertical clearway height of $l_1 \geq 1\,950$ mm minimum (see Figure 1 and 3 for the measuring method).

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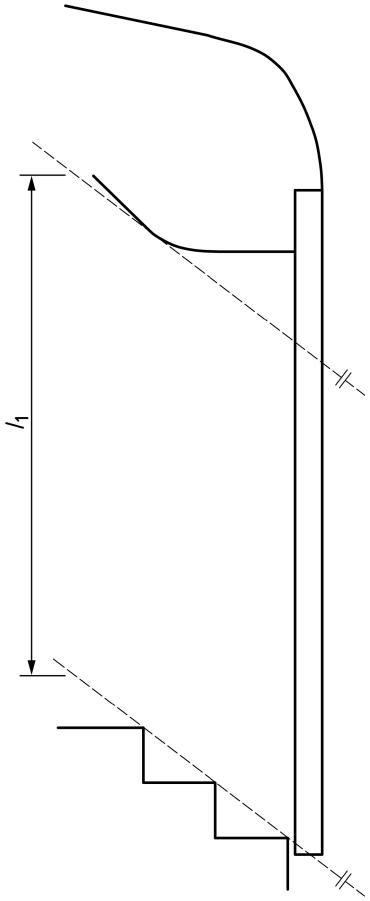
Dimensions in millimetres



Key

l_1 ≥ 1950 mm

Figure 3 — Minimum height

4.1.2 Steps

4.1.2.1 Entrance area – General

External steps shall have at least a usable width of 95 % of the clear width of the door and be in line with the usable width of the door.

Internal steps should have at least the same clear width as the door and be in line with the throughway of the door.

Passenger access from the defined platform to the vestibule of the vehicle shall be achieved with a maximum of four steps.

4.1.2.2 Step dimensions

4.1.2.2.1 Internal steps for external access

Internal steps for external access shall have a maximum height of l_1 = 200 mm and a minimum depth of l_4 = 240 mm between the vertical edges of the step. The rising height of each step shall be equal.

The height of each step may be increased to a maximum of l_1 = 230 mm if it can be demonstrated that this achieves a reduction of one in the total number of steps required.

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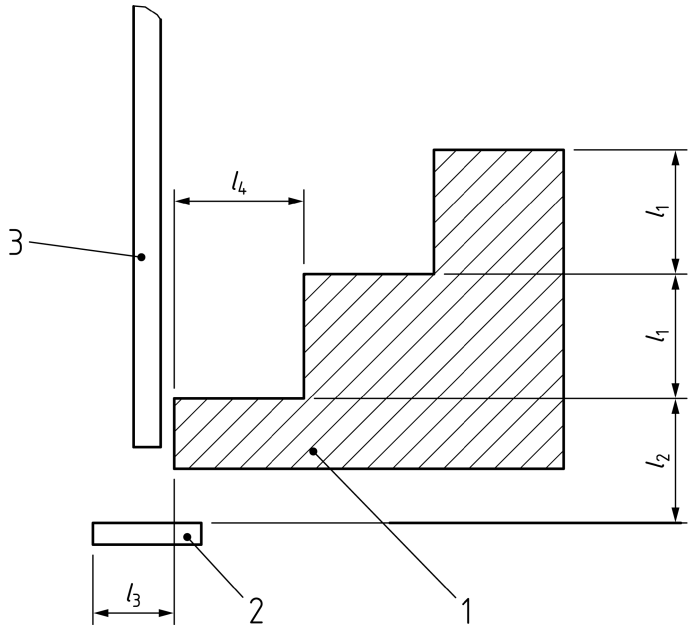
EXAMPLE If a vertical distance of 460 mm is to be traversed, it can be demonstrated that using steps of up to l_1 = 230 mm reduces the number of steps required from 3 to 2.

See Figure 4 for details.

4.1.2.2.2 External steps

An external access step, fixed or moveable, shall have a maximum height of l_2 = 230 mm between steps and a minimum depth of l_3 = 150 mm.

Dimensions in millimetres



Key

1	Fixed steps inside the train	l_1	≤ 200 or ≤ 230	l_4	≥ 240
2	External fixed or moveable step	l_2	≤ 230		
3	Door leaf	l_3	≥ 150		

Figure 4 — Step dimensions

A minimal drop in level, with a maximum of l_2 = 60 mm (Figure 4), between the floor surface of the vestibule/last step and that of the external step of the vehicle used to guide and seal the door is also permissible and shall not be considered as a step so the minimum depth of l_3 = 150 mm (Figure 4) does not apply. See Figure 5 for the permissible position of the external extension of the door sill.

If the external step depth l_3 is ≥ 150 mm the surface of the exterior step may be used as a reference for defining the stepping height when stepping up from a lower platform whereas the floor surface of the vestibule may be used when stepping down from a higher platform.

If a step is fitted and it is an extension of a door sill outside the vehicle, and there is no drop in level between the floor surface of the vestibule and that of the external step of the vehicle, this shall not be considered to be a step for the purposes of this specification. See Figure 5 for details.

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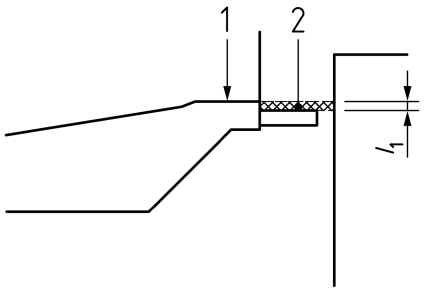

Key

1 Floor surface vestibule l_1 ≤ 60 mm

2 Extension of door sill

Figure 5 — Extension of door sill

The constructial requirements for boarding aids (moveable steps and ramps onboard rolling stock) shall be carried out in accordance with EN 16586-2:2017, 5.2, 5.3 and 5.5.

The maximum allowable displacement at the unsupported end of the device under a load of 150 N (refer to Annex J.3) applied in the middle of the device shall be less than 5 mm.

4.1.2.3 Step surface

Steps shall be provided with a slip resistant surface across the usable surface area.

The first and the last step inside the vehicle shall be indicated by a contrasting band with a depth of 45 mm to 55 mm extending the maximum useable width of the steps on the front and the top surfaces of the step nosing.

The first and the last step outside the vehicle shall be indicated by a contrasting band with a depth of 45 mm to 55 mm extending the full width of the steps on the top surfaces of the step nosing.

NOTE See EN 16584-1:2017, 5.3.7, 5.3.9 for further details.

4.1.2.4 Protection against water accumulation

The steps shall be arranged to allow water to drain away from the anti-slip surface. The design shall prevent water accumulation.

4.1.2.5 Manual operation

If a retractable step fails to close and the deployed step exceeds the vehicle kinematic gauge, it shall be possible to manually retract the step to a closed position, particularly from the platform it is intended for.

The operation manuals shall include an instruction stating that the step drive shall be isolated prior to manual operation, if this is necessary to avoid a possible injury due to the activation of the automatic drive.

4.1.3 Staff Access from track level

If required in the technical specification, means shall be provided to ensure access and egress to and from the track level for staff on dedicated doors. The requirements for staff access/egress to the vehicle from track level shall fulfil EN 16116-1:2022. If additional specific requirements are needed for staff doors and nominated passenger doors, they shall be detailed in the technical specification.

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4.1.4 Relative position of the step edge

The relative position of the step edge in relation to the vehicle body shell and vehicle floor (dimensions l_2 and l_3 of Figure 4) shall be defined in the technical specification considering the requirements regarding the gap between step and platform.

NOTE See EN 16586-1:2017 for further details.

4.1.5 Train surfing

Handholds on the outside surface of the entrance system shall be avoided or designed so they are minimizing grip when the doors are closed (to avoid so called 'train surfing') unless needed for crew access.

4.1.6 Door windows

Doors shall be fitted with transparent windows to allow passengers to identify the presence of a platform.

All door windows shall be fitted with safety glass (either laminated or toughened glass) which is in accordance with a relevant national or international standard. Other material achieving a comparable level of safety may also be used.

Where the distance of the lower edge of the door window is less than $h_1 =$ 800 mm (recommended 1 000 mm) above vehicle floor level adjacent to the door, a means of protection shall be provided to prevent passengers falling through the window when broken. Where internal steps are fitted this dimension shall be increased to $h_2 =$ 1 000 mm (recommended 1 200 mm).

In case there is a step downwards inside adjacent to the door the minimum dimension of h_3 = 1000 mm shall be achieved (see Figure 6). In case these windows are used for emergency egress or access, h_3 may be reduced to 800mm.

Protection may be achieved by the use of a suitable laminated glazing system retained by appropriate fixing (mechanical retention, suitable bonding, etc.), or mechanical elements (e.g. a bar) or equivalent measures. If bars are used, they shall be fitted so that they do not create hazards to passengers.

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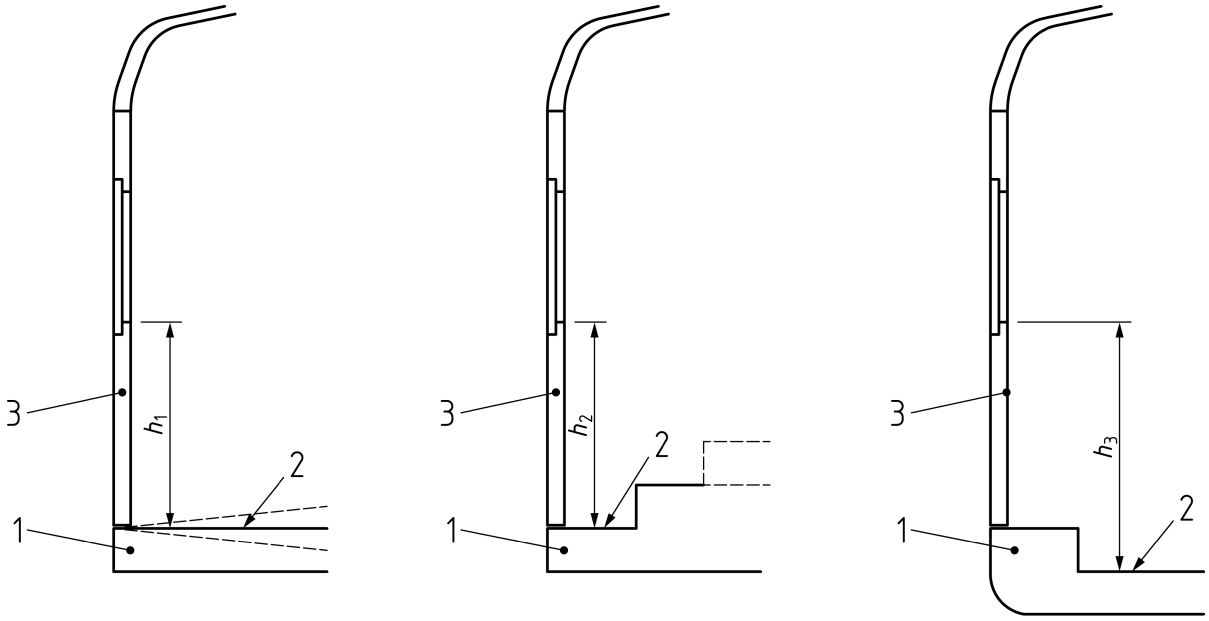

Key

1	First step inside the train	h_1	800 mm
2	Floor level	h_2	1 000 mm
3	Door leaf	h_3	1000 mm

Figure 6 — Height of bottom edge of window

4.1.7 Design of body side entrance doors used for accessing driver's cabs

The requirements for staff access/egress to the vehicle from track level shall fulfil EN 16116-1:2022. If additional specific requirements are needed for staff doors and nominated passenger doors, they shall be detailed in the technical specification.

4.1.8 Water drainage

Means shall be provided to divert water from the vehicle roof away from the door throughway.

4.2 Mechanical strength

4.2.1 Door mechanical strength

4.2.1.1 Passenger retention forces

The doors shall withstand the forces that occur when passengers are leaning or falling against the door leaves without causing any non-elastic deformation or loss of operation. It is permissible for some residual deflection after first loading to occur.

For this purpose, a closed and locked door including the glazing shall withstand a pushing force applied from inside the vehicle onto the door leaf.

The load shall be represented by the application of a load distributed over an area of 200 mm in height, positioned l_2 = 1 300 mm above threshold. The value of this force shall be 1 000 N per linear metre over the width of the exposed internal surface of the door (see also Figure 7).

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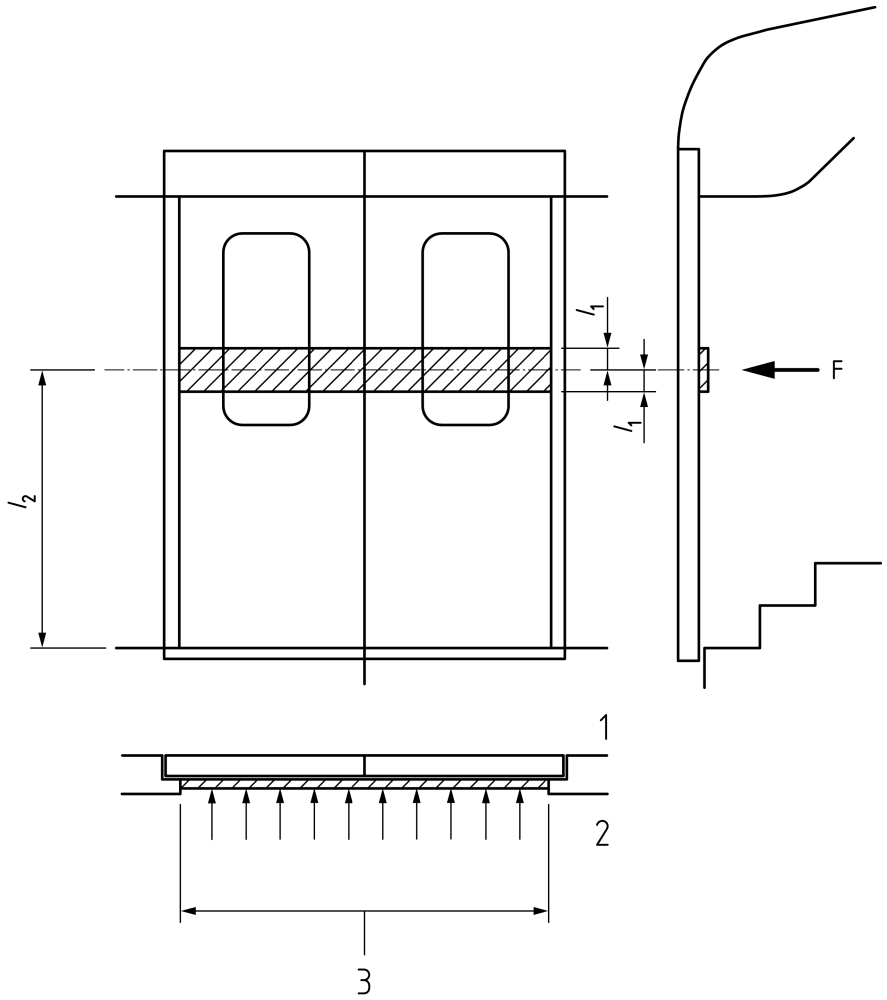
Structural integrity of the door system shall be maintained up to load of 5 000 N per linear metre exposed width as mentioned above and additionally a local load of 800N on a surface of 0,1x0,1m applied at the weakest structural area of on leaf without fracture or collapse.

The door and associated components may not necessarily remain operational after the application of this load.

Dimensions in millimetres



Key

1	Outside of doors	l_1	100 mm
2	Inside of doors	l_2	1 300 mm
3	Exposed internal surface	F	1 000 N/m

Figure 7 — Arrangement for load case "passenger retention"

The locking system on sliding doors shall withstand a force in the opening direction of 1 200 N.

4.2.1.2 Aerodynamic stresses

Doors shall be capable of withstanding the effects of pressure pulses as given in Annex F, applied over the surface of the door without causing any non-elastic deformation or loss of operation. Some residual deflection after first loading may occur.

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4.2.1.3 Relation to vehicle gauge

Under normal operation the loads defined in 4.2.1.1 and 4.2.1.2 may cause elastic door deformations. The technical specification shall define the acceptable limits so as not to infringe the kinematic gauge of the vehicle.

4.2.1.4 Vehicle overturning case

The door strength shall withstand without fracture or collapse the following load case based on vehicle overturning, if such load case is required in the technical specification:

— a static pressure of 6 kPa over its exposed internal surface.

The door and associated components may not necessarily remain operational after the application of this load.

4.2.1.5 Ability to withstand vibration and shock

The entrance system shall be designed to withstand the load cases as defined for vibrations and shocks as defined for equipment attachments in EN 12663-1. When required in the technical specification vibration and shock testing of mechanical components shall be carried out in accordance with EN 61373. The acceptance criteria for such test shall be defined in the technical specification.

4.2.2 Step(s) mechanical strength

The following requirements shall apply:

— the steps shall be capable of withstanding a concentrated downward vertical load of 2 kN. This shall be applied on a surface area of 100 mm × 200 mm at any position on the exposed step surface without causing non-elastic deformation wheras some residual deflection after first loading may occur.

— the steps shall be capable of withstanding a downward vertical load of 4 kN/m on the exposed length of the step equally distributed across the exposed surface without causing non-elastic deformation (see Figure 8), whereas some residual deflection after first loading may occur.

— means shall be installed in order to maintain the stability of moveable steps in the deployed and retracted position during normal operation.

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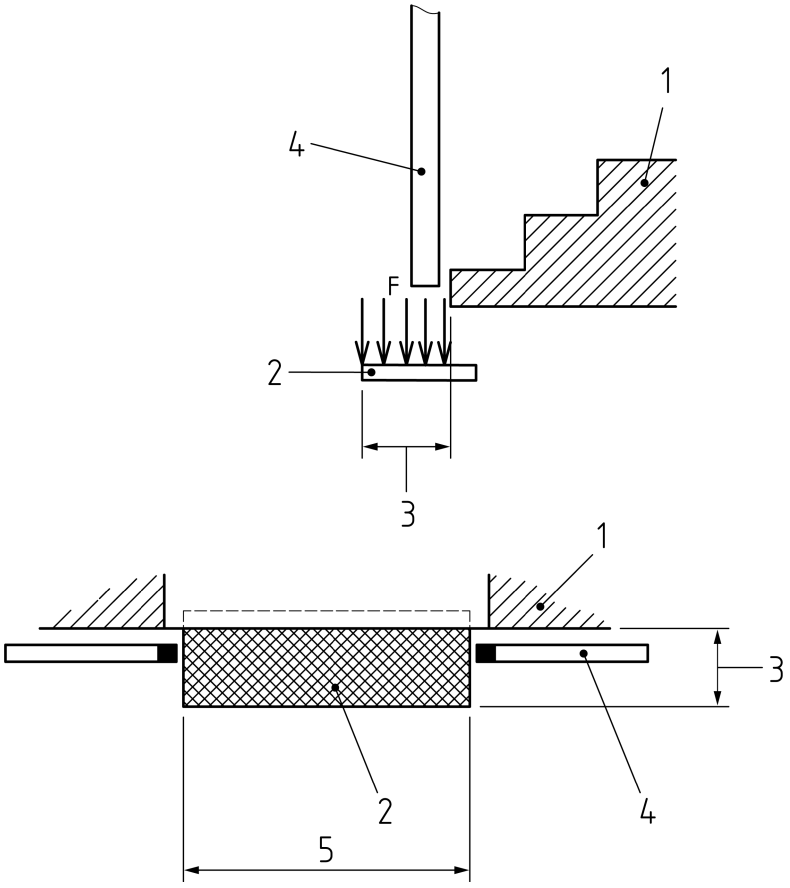

Key

1	Vehicle	4	Door leaf
2	External fixed or moveable step	5	Exposed length
3	Exposed width	*F*	4 kN/m

Figure 8 — Step mechanical strength

4.3 Local door operating devices

4.3.1 Door control device

4.3.1.1 General

Door controls include devices for operating doors, whether they are pushbuttons or other controls

Where door control devices for passenger 'open' and/or 'close' functions are required by the technical specification or by Regulation (Interoperability), the requirements of 4.3 shall be met.

4.3.1.2 Inside

If the door control devices are fitted on the door leaf, then:

— on single leaf doors they should be located near the leading edge of the door.

— on double leaf doors, the door control devices should be located on the right-hand leaf (seen from inside) adjacent to the leading edge of the door.

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If the door buttons are provided on the door pillar, they should be fitted as close as possible to the door leaf.

4.3.1.3 Outside

On single-leaf doors the door control devices for 'open' and/or 'close' should be located near the leading edge of the door. On double-leaf doors, the door control devices should be located on the left-hand leaf (seen from outside) adjacent to the leading edge.

If it is not practicable to mount the door open control device on the moving door leaf (e.g. pocket sliding door) then door control devices should be provided on the door pillar as close as possible to the door leaf.

4.3.1.4 Passenger door control device location

The centre of exterior door control devices, operable from the platform, shall be not less than 800 mm and not more than 1 200 mm measured vertically above platforms, for all platforms for which the train is designed (defined in the technical specification). If the train is designed for a single platform height, the centre of exterior door control devices shall be not less than 800 mm and not more than 1 100 mm measured vertically above that platform height.

The centre of internal door control devices for the exterior door shall be not less than 800 mm and not more than 1 100 mm measured vertically above the vehicle floor level.

Where door 'open' and 'close' control devices are provided, the upper door control device shall be the 'open' control device.

The door control devices shall be positioned so that an opening door does not create a trapping hazard for the operating hand.

If additional door control devices for wheelchair users are agreed in the technical specification, they shall be mounted below any other control devices within the range defined in this clause.

4.3.1.5 Door control device design

The design and the appropriate pictograms are given in A.1, A.2 and A.3.

4.3.1.6 Colour of door control devices

Requirements are given in A.2.

4.3.2 Emergency egress device

4.3.2.1 Quantity and location of emergency egress device

Each door shall be equipped with an emergency egress device.

The centre of the operating element of the emergency egress device shall be located inside the car in the area adjacent to the door (shown in the hatched zone of Figure 9).

NOTE Requirements for passenger emergency exit are given in EN 45545-4.

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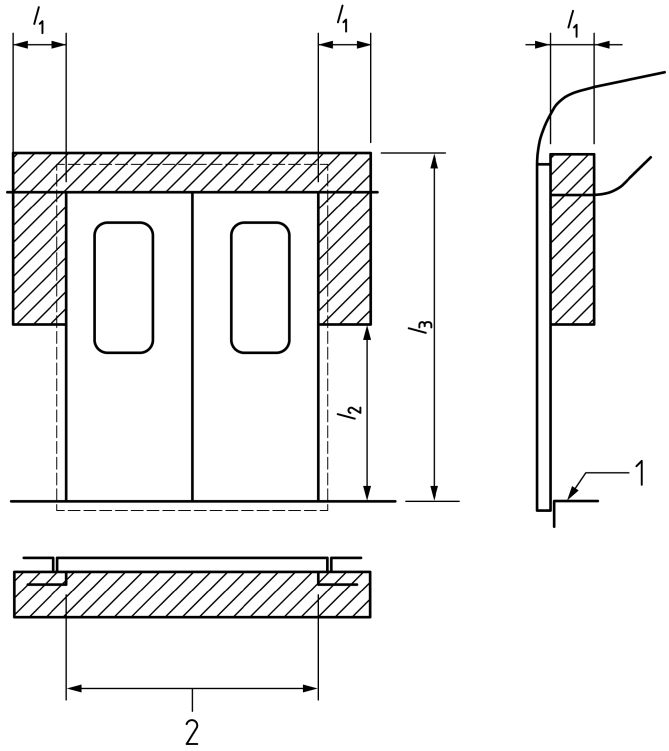

Key

l_1	400 mm	1	Vestibule floor level
l_2	900 mm	2	Throughway
l_3	1 950 mm		

Figure 9 — Emergency egress device location

4.3.2.2 Design of emergency egress device

An example of the recommended type and operation of the emergency egress device is shown in A.4.

4.3.2.3 Colour of emergency egress device

The colour of the emergency egress handle shall be red (recommended colour RAL 3020 in accordance with DIN 6164-1 and DIN 6164-2). It is recommended that the complete device is coloured in red in accordance with RAL 3020.

In case of local regulations or request of operators, different colours may be specified in the technical specification.

In case a two-stage operation is provided (e.g. Alarm handle and door release button) and the door is held closed until it is safe for the passenger to leave, the second device (e.g. Control devices) may be coloured green.

4.3.3 Access device

4.3.3.1 Quantity and location of access device

The operating element of the access device shall be located in the area adjacent to the door at a height so that it can be operated from track and from all relevant platform levels.

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The quantity and location of the access devices are specified in other regulations or in the technical specification.

Trains which conform to the Interoperability Directive shall be equipped with an access device at every door.

NOTE See also EN 45545-4.

4.3.3.2 Design of access device

The device shall be key or handle operated.

4.3.3.3 Colour of access device

It is recommended that the complete device is coloured in red in RAL 3020 in accordance with DIN 6164-1 and DIN 6164-2.

4.4 Labels/warning signs

Labels shall be used to instruct passengers on the use of the door equipment.

Symbols should be applied in preference to written instructions (or symbols used together with written information).

An example for suitable labels is given in Figure A.6 and IRS 10181. The ISO 3864 series may be used for guidance when designing labels.

A label, located adjacent to or on the relevant device, shall provide information on the operation of that device.

4.5 Interfaces with the vehicle

4.5.1 Electric and pneumatic power supplies

The electrical and pneumatic equipment of the door shall be designed to meet the requirements of EN 60077-1:2017, 8.2.1, 'Operating conditions'.

4.5.2 Mechanical interface with the vehicle

The mechanical design of the door shall incorporate adjustments and clearances required for the performance of that door, such as:

— adjustment of position;

— sealing; and

— motion, body deflection.

The door adjustment should be simple and limited; the setting devices shall be easily accessible for maintenance staff.

The tolerances and deflections imposed under various loading conditions shall be defined in the technical specification.

4.6 Other requirements

4.6.1 Fire protection

The fire protection (hazard level) of doors and associated equipment shall be defined in the technical specification to allow the overall vehicle fire requirements to be achieved. EN 45545-2 shall be fulfilled.

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4.6.2 Insulation

4.6.2.1 Sound insulation

The criteria for sound insulation shall be defined in the technical specification to allow the overall vehicle requirements to be achieved. If sound measurements are required for the doors, they shall be performed in accordance with EN ISO 10140-2.

4.6.2.2 Thermal insulation

The criteria for thermal insulation shall be defined in the technical specification to allow the overall vehicle requirements to be achieved.

If measurements are required, they shall be performed in accordance with EN ISO 12567-1.

4.7 Electronic equipment

4.7.1 Hardware

Electronic equipment shall be designed to conform to the requirements of EN 50155 and EN 50121-3-2.

4.7.2 Software for electronic door control systems

The software shall be designed to the necessary software integrity level (SIL) to achieve the overall safety requirements for the entrance system including envisaged failure modes.

NOTE EN 50657 gives rules concerning software for railway control and protection systems.

The function of the software shall be verified during the type test and in the case of door control system modification. Each software version released for passenger service shall be tested to verify the extent of change.

Functional integration with the vehicle shall also be verified, including in envisaged failure modes of the control interface.

4.8 Reliability, availability, maintainability, safety (RAMS)

If analyses concerning RAMS are required, the guidelines given in EN 50126 (all parts) shall apply. The details of the analyses shall be stated in the technical specification.

To demonstrate safety, the following top events shall be covered in a fault tree analyses:

— door opens at speed (refer to 5.1.2);

— step (or any semi-automatic ramp and bridging plates) opens at speed (refer to 5.1.2);

— emergency door opening of two adjacent doors fails when required (includes automatic and manual opening);

— door opens when not adjacent to a platform (including cases of no platform, short platform and platform at the wrong side);

— 'Closed and Locked' signal received but door is open;

— 'Closed and Locked' signal received but step is open;

— test object (Figure 13 or 16, which ever is applicable) not detected when trapped and door interlock system signals closed and locked (according to 5.2.2.1); and

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— closed step (or any semi-automatic ramp and bridging plates) wrongly detected as open and allows the door to open (risk for passenger falling on track).

Safety analyses shall be conducted in accordance with the following rules:

— mechanical modes are assessed by qualitative methods (calculation and static/dynamic testing);

— software modes are assessed by qualitative methods (according to EN 50657); and

— control modes are assessed by quantitative methods (FTA - fault tree analyses).

Any quantitative targets shall be specified on a single entrance system level.

The safety targets at entrance system level for each top event mentioned above shall be defined in the technical specification to achieve the overall safety requirements for the train operation.

Typical Hazards of entrance systems and related technical mitigation measures contained in this standard are outlined in Appendix N to assist when specifying entrance system requirements.

4.9 Protection against electrical hazards

Electrical equipment shall be designed to prevent direct and indirect contact with live components in accordance with the requirements given in EN 50153.

Entrance system components requiring access during maintenance for door setting/adjustment should not be positioned in the immediate proximity of any hazardous area, i.e. potential trapping hazard or electrical hazard, alternatively a local isolation system shall be provided.

Breakage of overhead contact wire should be taken into account.

The characteristics of the short circuit current shall be stated in the technical specification.

4.10 Environmental conditions

4.10.1 Weather

The environmental conditions for railway equipment are given in EN 50125-1, such as:

— temperature range;

— humidity;

— pollution; and

— ice, snow and rain.

Any deviation from the specified performance, e.g. at the temperature extremes, shall be specified in the technical specification.

Extended ranges in accordance with EN 50125-1 may be specified, if appropriate.

4.10.2 Water tightness

The door shall be designed to prevent water from entering into the vehicle when it is closed and locked.

The water tightness shall be tested as stated in the water test procedure in Annex B.

If a door is not capable of fulfilling the requirement of water tightness due to its design type (e.g. folding door, ventilation openings) then water entering the vehicle shall be drained adequately.

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