



BSI Standards Publication

Railway applications — Platform barrier systems

National foreword

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The UK participation in its preparation was entrusted to Technical Committee RAE/4/-/6, Railway Applications - Bodyside Entrances.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This standard specifies the minimum requirements for the construction and operation of platform barrier systems. The UK committee advises that if enhancements to the minimum requirements are needed to achieve overall system safety and operational requirements for users, then the details should be defined in the procurement specification.

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European foreword

This document (EN 17168:2021) 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of an identical text or by endorsement, at the latest by January 2022, and conflicting national standards shall be withdrawn at the latest by January 2022.

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Introduction

Platform barrier systems provide a movable barrier between trains and other guided transit vehicles, and passengers waiting at stations and boarding points.

Platform barrier systems are used increasingly on metro and other rail networks to ensure the safety of passengers on the station platform who are waiting to board vehicles. Such systems are also used on “people-mover” guided systems for short-distance transits, for example at airports. Their use is recommended by EN 62267 for any fully automated transit system.

In particular platform barrier systems can be used to control the risk of:

- incursion by passengers or other persons on the railway track (deliberate or accidental); and
- contact between passengers and moving vehicles.

These risks can be especially significant where there is the possibility of overcrowding on station platforms at busy locations. Barriers may increase the safely useable space in the station for passengers waiting and circulating on the platforms.

Platform barrier systems integrate the operation of the platform barrier doors and gates with opening and closing of train doors and also assist in the management of station operations, to safely permit higher speeds for trains entering and exiting the stations.

Barrier installations can also be part of a continuous partition between the running tracks and the station areas for the purposes of:

- fire safety (including smoke management);
- tunnel and station ventilation (including reduction of the piston effect);
- trackside noise reduction; and
- passenger comfort at climate-controlled stations.

Additionally, the terminology used in connection with platform barrier systems, in particular to improve the specification and understanding of safety requirements, should be standardized.

1 Scope

This document specifies requirements for the design, construction and operation of platform barrier systems positioned at the edge of a station platform immediately adjacent to the rail or other guided vehicles in stations and boarding points for passenger services. This document includes:

- requirements for the fixed structure and fixed parts along the platform;
- physical requirements for the movable doors and gates normally used by passengers;
- requirements for emergency doors;
- requirements for driver access doors;
- requirements for platform extremity doors; and
- requirements for the management of safety risks that are particular to barrier systems.

This document also gives requirements for the integration of barriers within the overall rail system, including:

- synchronization of vehicle and platform barrier doors/gates;
- audible and visible alerts;
- integrity of control systems;
- testing of the barrier installation;
- operational performance; and
- requirements relating to other interfacing sub-systems, notably signalling and vehicles.

For barrier systems set back from the platform edge, which are used to control access to trains or for crowd management, relevant sections of the document can be used as guidance.

This document applies to all persons involved in the implementation and system integration of a platform barrier system, including infrastructure owners, designers, installers and operators.

This document does not cover barrier systems using bars, ropes, etc. or which operate in a vertical direction.

This document applies to rail services, e.g. metro, tram systems and heavy rail services as requested by a project specification. It applies to small systems, working in conjunction with a single vehicle, or with larger systems working with a complete train.

This document applies to platform barrier systems used at sub-surface stations, enclosed surface stations (e.g. those enclosed for the purposes of providing an air-conditioned environment for waiting passengers), and those fully in the open-air.

This document does not cover normative requirements relating to fire performance or fire requirements arising from use of platform barrier systems as fire barriers.

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 1090-2, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

EN 1090-3, *Execution of steel structures and aluminium structures — Part 3: Technical requirements for aluminium structures*

EN 1125, *Building hardware — Panic exit devices operated by a horizontal bar, for use on escape routes — Requirements and test methods*

EN 1990:2002, *Eurocode — Basis of structural design*

EN 1991-1-1:2002, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*

EN 1991-1-4, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 1993-1-1, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1993-1-9, *Eurocode 3: Design of steel structures — Part 1-9: Fatigue*

EN 1998-1, *Eurocode 8: Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 1999-1-1, *Eurocode 9: Design of aluminium structures — Part 1-1: General structural rules*

EN 1999-1-3, *Eurocode 9: Design of aluminium structures — Part 1-3: Structures susceptible to fatigue*

EN ISO 12543-1, *Glass in building — Laminated glass and laminated safety glass — Part 1: Definitions and description of component parts (ISO 12543-1)*

EN 12600, *Glass in building — Pendulum test — Impact test method and classification for flat glass*

EN 13272-1, *Railway applications — Electrical lighting for rolling stock in public transport systems — Part 1: Heavy rail*

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

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13501-6, *Fire classification of construction products and building elements — Part 6: Classification using data from reaction to fire tests on power, control and communication cables*

EN 14752:2019, *Railway applications — Body side entrance systems for rolling stock*

EN 16584-1, *Railway applications — Design for PRM use — General requirements — Part 1: Contrast*

EN 16584-3, *Railway applications — Design for PRM use — General requirements — Part 3: Optical and friction characteristics*

EN 50121-4, *Railway applications — Electromagnetic compatibility — Part 4: Emission and immunity of the signalling and telecommunications apparatus*

EN 50122-1:2011, *Railway applications — Fixed installations — Electrical safety, earthing and the return circuit — Part 1: Protective provisions against electric shock*

EN 50122-2, *Railway applications — Fixed installations — Electrical safety, earthing and the return circuit - Part 2: Provisions against the effects of stray currents caused by d.c. traction systems*

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

EN 50128, *Railway applications — Communication, signalling and processing systems — Software for railway control and protection systems*

EN 50129, *Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling*

EN 50162, *Protection against corrosion by stray current from direct current systems*

HD 60364-4-41, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

HD 60364-5-54, *Low-voltage electrical installations — Part 5-54: Selection and erection of electrical equipment — Earthing arrangements and protective conductors*

HD 60364-6, *Low-voltage electrical installations — Part 6: Verification*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments*

EN 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments*

EN 61140, *Protection against electric shock — Common aspects for installation and equipment*

EN 62061, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

EN 62290-2:2014, *Railway applications — Urban guided transport management and command/control systems — Part 2: Functional requirements specification*

EN 62305-1, *Protection against lightning — Part 1: General principles*

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:

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

3.1

correct alignment

correct position of the doors of the vehicle relative to the corresponding platform barrier doors/gates, to permit safe and efficient transfer of passengers between vehicles and platform

3.2

doorway

section of a platform barrier through which passengers can board or alight from vehicles when platform doors/gates are open

3.3

driver access door/gate

openable panel in a platform door or gate system designed to align with the driving cab door of a train stopped at the station or boarding point

Note 1 to entry: Such panels (if provided) can open with a hinged or sliding action.

3.4

emergency egress device

operating element for manual opening from the trackside, in case of emergency, of any type of platform door or gate

3.5

emergency egress door/gate

panel in a platform door or gate system which can be opened in an emergency, or if the vehicle(s) are not in correct alignment with the platform doors/gates

Note 1 to entry: Emergency egress doors/gates can be of any design - hinged/sliding/push-out, etc.

3.6

entrapment

trapping of a person between the vehicle bodyside and the platform barrier after the vehicle and platform doors/gates have been closed

3.7

façade

complete framework and panels (fixed and moving) of the platform barrier

3.8

finished floor level

level of the platform floor when all surface finishes (e.g. tiles, screed, threshold) have been applied

3.9

glazing

glass or equivalent transparent material fixed in frames as part of a platform barrier system

3.10

leading edge

vertical edge of a door or gate, leading during closing movement

3.11

local control panel

centralized control panel adjacent to or in the vicinity of the platform barrier which enables opening and closing of a complete set of doors/gates in a barrier system by operations staff

3.12

mechanical gap filler

movable device mounted at the platform edge, at a platform door or gate, fully automatic and actuated/controlled in conjunction with the barrier system opening/closing sequences

Note 1 to entry: The purpose of a mechanical gap filler is to reduce the horizontal stepping distance to a vehicle to acceptable limits, or to facilitate access to a vehicle by persons with reduced mobility. Its structural integrity does not rely on support from the vehicle.

3.13

operations staff

persons including train crew and station personnel authorized to perform tasks concerning train operation or direct service to passengers

3.14

passive gap filler

strips, of frangible or partly flexible material at a doorway threshold such that the clearance between a moving vehicle and the threshold can be safely reduced below that normally specified for gauge clearance between infrastructure and vehicles

3.15

person with reduced mobility (PRM)

person whose mobility when using transport is reduced due to any physical disability (sensory or locomotory, permanent or temporary), intellectual disability or impairment, or any other cause of disability, or as a result of age, and whose situation needs appropriate attention and adaptation to his or her particular needs of the service made available to all passengers

[SOURCE: EU Directive 2007/1371/EC]

Note 1 to entry: this population covers as well persons of small stature, elderly ones, pregnant women, persons carrying heavy luggage or accompanied by children (including children in strollers).

3.16

platform

section of pathway, alongside tracks at a railway, metro or other guided transit system station at which passengers can board or alight from vehicles

3.17

platform barrier system (PBS)

system providing a protective barrier between vehicle and platform, having power operated movable panels with associated drive and control equipment, such panels moving horizontally and parallel with edge of the platform, allowing passenger transfer through the barrier when a train is positioned at the platform

3.18**platform door**

movable panel or panels and forming part of a platform door system through which passengers normally access and egress vehicles

3.19**platform door system**

platform barrier system in which the movable panels are carried on a portal structure having headers or lintels above the moving panels, carrying all or part of their weight

Note 1 to entry: Such a system can form part of a structure completely enclosing the platform area and separating it entirely from the track on which vehicles move.

3.20**platform extremity door/gate**

panel at the extremity of a platform door or gate system (usually, but not necessarily, at right angles to the main structure) to allow access by authorized persons to the track, or to a tunnel walkway beyond the station, or as emergency egress for persons evacuating from the track area

Note 1 to entry: Such panels can open with a hinged or sliding action.

Note 2 to entry: Platform extremity door/gates may not form part of the platform barrier system.

3.21**platform gate**

movable panel or panels forming part of a platform gate system through which passengers normally access and egress vehicles

3.22**platform gate system**

platform barrier system in which the movable panels are supported from the bottom, or by cantilever arrangement at an intermediate height on the barrier

3.23**routine test**

conformity test made on each individual item of equipment during or after manufacture

3.24**station**

unit comprising buildings and structures containing technical equipment, loading or unloading areas or platforms, and any associated areas for reception and shelter

3.25**synchronization of doors**

co-ordinated movement of vehicle doors with platform doors/gates

3.26**system integration**

process of assuring that the design, installation and operation of the barrier system is consistent with the overall safety and operational targets of the complete rail system, of which the barrier system is part

Note 1 to entry: The activity of system integration is elaborated on in Annex D (informative).

3.27

train

single self-propelled rail vehicle or a self-propelled group of physically coupled rail vehicles

[SOURCE: EN 17343:2020]

3.28

type test

conformity test made of one or more system and its components representative of the production to prove that the design meets the standard and the relevant specifications

3.29

user population

range of persons (including operations staff) expected to use a platform barrier system, defined in terms of their physical characteristics

4 System design requirements

4.1 Physical and structural requirements of the platform barrier

4.1.1 General structural requirements

4.1.1.1 Platform barrier systems form a safety barrier separating customers/passengers from moving trains until it is safe to grant access. As such they shall be designed to resist crowd loading. Platform barriers are also subject to aerodynamic loads induced by trains passing the structure. Platform barrier systems installed in open sections shall also resist wind loading. In addition, platform barrier systems can be subject to pressures generated by tunnel ventilation systems and can be required to resist earthquakes. These separate actions shall be combined in accordance with Structural Eurocodes referenced in this standard.

4.1.1.2 Tunnel ventilation systems can be associated with platform barrier systems that completely enclose the platform area, separating it from the track on which vehicles move. Detailed modelling/simulation shall be undertaken during system integration and shall consider all operating and degraded modes of operation of the ventilation system to determine their effect on the platform barrier system and how they combine with the aerodynamic actions from trains. In particular, pressures generated by operation of ventilation systems for smoke extraction or fire management shall not inhibit operation of emergency doors in accordance with 4.1.7. The ventilation and aerodynamic loading values from the modelling/simulation shall form an input to the specification for the platform barrier system.

4.1.1.3 Structural design shall take into account the requirements arising from the physical interface with trains intended to operate in conjunction with the barrier system, in particular regarding entrapment (4.1.10) and gauging (5.1.3).

4.1.1.4 General construction of platform barriers shall be in accordance with the Structural Eurocode series. EN 1991-1-1 covers general actions and imposed loads. Imposed loads are defined by categories of use in EN 1991-1-1:2002, Clause 6. This series of standards explicitly includes barriers on railway platforms, in particular Category C5 which gives requirements for “Areas susceptible to large crowds, e.g. in building for public events like concert hall, sports halls including stands, terraces and access areas and railway platforms.”

4.1.1.5 The Structural Eurocode series of standards mandate the use of Ultimate and Serviceability Limit States to ensure the safety of a structure in extreme conditions (e.g. storm-force winds for open-air systems) and combinations of loads; however, normal operation of the platform doors/gates might not be practicable under all such limit states. At least one Operational Limit State should be specified to reflect normal operation of the barrier system. Further guidance is given in Annex B.

4.1.1.6 Deflection of the platform barrier system towards the track under any loading conditions envisaged in this standard shall not exceed the limits defined by the gauging strategy for the platform barrier system as described in 5.1.3. Plastic deformation may be permitted under Ultimate Limit State as defined by the Eurocodes referenced in Annex B, subject to compliance with the gauging strategy.

4.1.1.7 Infill panels (i.e. glazing, or sheets of other materials, which separate the platform area from the running tracks and are secured to the main structural framework of the barrier system) shall sustain the applied loads.

It is recommended that, in addition, deflection of an infill panel that is structurally safe should not alarm station users through large visible deformations relative to the frame in which the panel is mounted, when subject to normal service conditions. Therefore, for serviceability considerations, the limiting condition for deflection should be that the total horizontal displacement of the infill panel relative to the frame at any point from its original unloaded position does not exceed the deflection limits determined from the relevant structural design code (where applicable) for the material used, or 25 mm, whichever is the smaller.

4.1.1.8 The calculations used in structural design shall be validated by load testing of a representative structure.

NOTE This standard covers the requirements for the platform barrier system. It does not specify requirements for the platforms, or other foundations and structures to which the platform barrier system is secured. Design and construction of platforms, foundations or other structures are covered by other appropriate structural Eurocode documents. However, the load cases considered in such designs are consistent with those adopted for the design of the platform barrier system.

4.1.2 Structural design principles

4.1.2.1 Designs shall be in accordance with the requirements of EN 1990.

4.1.2.2 Where steel is used, structural design shall be in accordance with EN 1993-1-1.

4.1.2.3 Where aluminium is used, structural design shall be in accordance with EN 1999-1-1.

4.1.2.4 In the event that structural materials other than steel or aluminium are used, performance of the design shall be demonstrated to be equivalent with the performance requirements of Eurocodes category C5 as defined in 4.1.1.4.

4.1.2.5 Where required by the relevant National Annex to EN 1998-1 regarding design of structures for earthquake resistance, the provisions of EN 1998-1 shall be applied in addition to the provisions of the other relevant Eurocodes.

4.1.2.6 Where glass is used the thickness of the glazing material may be calculated using validated mathematical analysis. Alternatively, thickness may be determined using empirical national codes.

Use of empirical codes can result in conservative design and increased weight. Calculated methods are recommended where possible.

4.1.3 Structural loading conditions

4.1.3.1 Crowd loading

4.1.3.1.1 Design for horizontal crowd loading shall be in accordance with EN 1991-1-1:2002, 6.4. The characteristic value for the line load q_k as defined in the standard shall be selected from the range for Category C5 from Table 6.12.

4.1.3.1.2 The design value for crowd loading shall correspond to the minimum value defined in EN 1991-1-1:2002 category C5 from Table 6.12. A higher value shall only be considered when a site-specific risk assessment confirms a greater value is required. The structural design should not be specified beyond what is essential in foreseeable conditions. "Over-design" may result in increased volume and mass of moving and other parts with disadvantages for gauging and for safe and efficient motion of doors and gates.

4.1.3.2 Aerodynamic loading from trains

4.1.3.2.1 Aerodynamic loads arising from the movement of trains alongside platform barrier systems that completely enclose the platform area shall be considered in the structural design of the barrier. In such a case the platform area is completely separated from the track on which vehicles move (e.g. where separation is designed to support operation of a tunnel ventilation system, or climate control of the station). Such systems shall be fully analysed in accordance with the requirements of 4.1.1.2.

4.1.3.2.2 Aerodynamic loads arising from the movement of trains alongside platform barrier systems that do not fully enclose the platform area shall be considered in the structural design of the barrier. In such cases design loads may be calculated in accordance with the methodology in Annex E or be based on empirical measurement of comparable train and barrier combinations.

4.1.3.2.3 When assessing the mechanical and fatigue strength requirements of the barrier structure, the aerodynamic actions can be assumed to be of an equivalent amplitude at the front and back of the train and, in the case of coupled train units, also at the inter-unit coupler. This amplitude shall be taken to be the largest of the actions generated during the complete time of passing of the train.

4.1.3.2.4 Since aerodynamic loading occurs every time the train passes or moves alongside a barrier, the loads calculated in accordance with 4.1.3.2.1 or 4.1.3.2.2 shall be considered as fatigue loads.

4.1.3.2.5 Wind loading shall be considered in accordance with EN 1991-1-4 (including associated National Annexes).

4.1.3.3 Fatigue

4.1.3.3.1 Structural fatigue performance shall satisfy the required safety and performance for the design life of the installation. In particular, design against structural fatigue failure for steel and aluminium elements shall be assessed in accordance with the following standards (including their associated National Annexes):

- EN 1993-1-9, *Eurocode 3 — Design of steel structures - Part 1-9: Fatigue* (for steel); and
- EN 1999-1-3, *Eurocode 9 — Design of aluminium structures - Part 1-3: Structures susceptible to fatigue* (for aluminium).

4.1.3.3.2 The fatigue effects of aerodynamic loading from passing trains shall be considered for all platform barrier systems. The fatigue spectrum should not be specified beyond what is essential in foreseeable conditions. “Over-design” can result in increased volume and mass of moving and other parts with disadvantages for gauging and for safe and efficient motion of doors and gates.

4.1.3.3.3 If relevant, the fatigue effects of wind loading shall be considered for platform barrier systems installed in open-air sections, taking account of established meteorological conditions as determined in compliance with 4.1.11.1.

4.1.3.3.4 Crowd loading shall not be considered to be cyclical for the purposes of assessing the fatigue life of the platform barrier system.

4.1.4 Glazing and other panelling materials in facades, including doors and gates

4.1.4.1 General principle

There is no normative requirement to make doors and gates, or the fixed part of the façades, fully or partly transparent, but where glazing materials are used, the requirements of 4.1.4.2 shall be applied. Where partial transparency is achieved through use of mesh or perforated material the requirements of 4.1.4.3 shall be applied.

4.1.4.2 Requirements for glazing materials

4.1.4.2.1 Where glass is used as a panelling material, it shall be of a type that does not fracture in a way that creates hazard to passengers.

4.1.4.2.2 The glazing shall not readily fail in a way that creates an aperture in the barrier that passengers can reach through and be exposed to hazards from moving trains.

4.1.4.2.3 Where laminated glass is used it shall be in accordance with EN ISO 12543-1.

4.1.4.2.4 Glazing used shall achieve level 1-B-1 in accordance with the quantification tests given in EN 12600. The test described in EN 12600 is primarily designed for laminated glass, however, where other types of glass are used they shall achieve an equivalent level of safety in respect of the requirements in 4.1.4.2.1 and 4.1.4.2.2.

4.1.4.2.5 Alternative glazing materials shall as a minimum fulfil the same requirements as glass in respect of impact resistance, and shall meet the general requirements for penetration, deflection under load, and fire and smoke performance defined in the relevant sections in this standard, in particular 4.1.1 and 4.1.6.

4.1.4.2.6 Where glazing is fully transparent and extends to the full height of the doorway, strips or patterns of non-transparent material or finish shall be added to the glazing to reduce the possibility of accidental contact by passengers.

4.1.4.3 Mesh, perforated and other materials

4.1.4.3.1 Where panels made from mesh or perforated material are used the edges of the meshes or perforations shall not have sharp edges or projections likely to cause injury.

4.1.4.3.2 It shall not be possible for any person from the user population to pass any part of their body through the mesh or perforation of a panel such that they might be injured by opening or closing of a door/gate, or by the movement of a train. This shall be achieved by ensuring that the degree of protection corresponds to level IP3x of EN 60529.

4.1.4.3.3 Mesh or perforated panels shall meet the general requirements relating to fire and smoke performance, deflection under load and impact resistance defined in the relevant sections in this standard, in particular 4.1.1 and 4.1.6.

4.1.4.3.4 Mesh or perforated materials shall not be used for moving panels because of the increased risk of finger trapping or of clothing etc. being drawn into door/or gate systems.

4.1.4.3.5 Any other materials used as panelling in any part of the façade shall meet the general requirements relating to fire and smoke performance and deflection under load, defined in the relevant sections in this standard in particular 4.1.1 and 4.1.6. The materials shall also meet the intent of requirements of 4.1.4.2.1 and 4.1.4.2.2 regarding fracture and response to impact.

4.1.5 Fire performance – use as a fire barrier

Full height platform barriers at sub-surface or enclosed stations may be used as a direct fire barrier, to minimize the spread of flame and/or smoke in the event of a fire on either side of the barrier, or simply to segregate ventilation in the station and track areas. If a platform barrier system is intended to be used as a fire barrier, requirements of this standard are still applicable, but in that case such a barrier shall also conform to additional and relevant fire standards for buildings or national rules outside the scope of this standard.

4.1.6 Fire performance - fire resistance of materials

4.1.6.1 Materials used shall have fire resistance properties in accordance with national rules and European and national building codes. Components shall be defined and selected in accordance with the requirements of EN 13501-1, EN 13501-2 and EN 13501-6. It is the responsibility of the entity in charge of system integration to ensure that the fire performance of materials used, and fire scenarios considered in the design, are appropriate to the context and location in which the barrier system is installed.

NOTE There might be specific national and European rules for materials used in underground and tunnel environments (including, where the station falls within its scope, the Safety in Rail Tunnels Technical Specification for Interoperability).

4.1.6.2 The material used in the interlayer of laminated glass shall not be considered as contributing to a fire load unless specifically required by local regulations, provided that the laminated glass is fully compliant to all other relevant standards in accordance with 4.1.4.2 of this document.

4.1.7 Requirements for emergency egress doors/gates

4.1.7.1 It shall be possible for passengers to evacuate in an emergency from a train or vehicle at a station fitted with platform barriers, even if the train has stopped such that train doors and platform doors/gates are not in correct alignment.

4.1.7.2 The entity in charge of system integration shall, in accordance with the operational and safety rules for the use of the barrier system, make a risk assessment in accordance with national rules, for each platform barrier installation to decide whether, and to what extent, emergency egress doors/gates shall be included in the design to ensure that the above objective is achieved. Factors for consideration shall include for example:

- the total number of passengers who might need to make an emergency evacuation from a train;
- the possibility of safe emergency egress from the non-platform side of the train;
- the total number and width of doors/gates provided for normal use;

- the probability that a train might be immobilized in a way that vehicles are completely misaligned with the normal doors/gates;
- the capability of the driver and/or train control system to move the train a short distance to achieve correct alignment; and
- the need for evacuation of wheelchair users and other persons with reduced mobility.

4.1.7.3 The risk assessment shall be made at railway system level, taking into consideration the overall safety risk factors (e.g. whether the installation is at a sub-surface station, fire control measures, level of system automation, etc.).

4.1.7.4 Where emergency egress doors/gates are provided they shall meet the relevant requirements of EN 1125 regarding release and operating forces. The release mechanism shall be accessible from a doorway of an adjacent vehicle, with the vehicle door fully open.

4.1.7.5 Where emergency egress doors/gates are provided they shall meet the minimum strength and other structural requirements as necessary for all other panels and doors/gates in the barrier system in accordance with 4.1.1.

4.1.7.6 Where provided, emergency doors shall have a minimum unrestricted vertical clearway of 1 950 mm (value in accordance with EN 14752 plus 50 mm allowance for vehicle suspension movement) measured from finished floor level, and emergency doors/gates shall have a minimum unrestricted horizontal clearway of 800 mm (value in accordance with EN 14752).

4.1.7.7 Where provided, emergency egress doors/gates shall be secure against unauthorized operation from the platform side.

4.1.7.8 Where provided, emergency egress doors/gates shall be detected as closed and locked to the same level of safety and integrity as the passenger doors/gates.

4.1.7.9 The operating handle or release device of an emergency egress door/gate shall be visually highlighted by use of colour contrast as defined and assessed by EN 16584-1.

4.1.7.10 Where emergency egress doors/gates are provided, geometrical compatibility of trains and Platform system doors (size and spacing between train doors) need to be taken into account in the layout of the emergency egress doors/gates (and/or in the risk analysis as per 4.1.7.2).

4.1.8 Requirements for driver access doors/gates

4.1.8.1 Where driver access doors/gates are provided as part of a barrier system they shall be secure against unauthorized operation from the platform side.

4.1.8.2 Where provided, driver access doors/gates shall be detected as closed and locked to the same level of safety and integrity as the passenger doors/gates.

4.1.8.3 The width and position of driver access doors/gates shall be such as to permit use by authorized staff to enter and leave the driving cab of the trains planned to stop at that station, assuming that the train has come to a standstill with correct alignment.

4.1.8.4 Operation of the driver access door/gate shall not, as far as practicable, impede normal operation and use of an adjacent passenger doorway (or vice-versa).