BS EN 45545-3:2013

BSI Standards Publication

Railway applications — Fire protection on railway vehicles

Part 3: Fire resistance requirements for fire barriers

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National foreword

This British Standard is the UK implementation of EN 45545-3:2013. It supersedes DD CEN/TS 45545-3:2009, which is withdrawn, and together with BS EN 45545-1:2013, BS EN 45545-2:2013, BS EN 45545-4:2013, BS EN 45545-5:2013, BS EN 45545-6:2013 and BS EN 45545-7:2013, it supersedes BS 6853:1999 which will be withdrawn on 10 December 2015.

The UK participation in its preparation was entrusted to Technical Committee FSH/19, Fire Precautions in Railway Transport.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Railway applications - Fire protection on railway vehicles - Part 3: Fire resistance requirements for fire barriers

Applications ferroviaires - Protection contre les incendies dans les véhicules ferroviaires - Partie 3: Exigences de résistance au feu des barrières au feu

Bahnanwendungen - Brandschutz in Schienenfahrzeugen - Teil 3: Feuerwiderstand von Feuerschutzabschlüssen

This European Standard was approved by CEN on 7 December 2012.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 45545-3:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by March 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 45545-3:2009.

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.

This series of European standards *Railway applications — Fire protection on railway vehicles* consists of:

— *Part 1: General*;

— *Part 2: Requirements for fire behaviour of materials and components*;

— *Part 3: Fire resistance requirements for fire barriers*;

— *Part 4: Fire safety requirements for railway rolling stock design*;

— *Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles*;

— *Part 6: Fire control and management systems*;

— *Part 7: Fire safety requirements for flammable liquid and flammable gas installations*.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

EN 45545-3 has been developed from existing fire safety regulations for railway vehicles from the International Union of Railways (UIC) and different European countries.

In using the operation and design categories defined in EN 45545-1, the requirements laid down in this part take into account the current operating conditions for European public rail transport.

1 Scope

This part of EN 45545 specifies the fire resistance requirements and testing methods for fire barriers for railway vehicles.

The objective of the measures and requirements, specified in this part of EN 45545, is to protect passengers and staff in railway vehicles in the event of a developing fire on board.

It is not within the scope of this part of EN 45545 to describe measures that ensure the preservation of the railway vehicles in the event of a fire.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1363-1:2012*, Fire resistance tests — Part 1: General requirements*

EN 1364-1, *Fire resistance tests for non-loadbearing elements — Part 1: Walls*

EN 1364-2, *Fire resistance tests for non-loadbearing elements — Part 2: Ceilings*

EN 1634-1, *Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware — Part 1: Fire resistance tests for doors, shutters and openable windows*

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

EN 45545-1:2013, *Railway applications — Fire protection on railway vehicles — Part 1: General*

EN 45545-5, *Railway applications — Fire protection on railway vehicles — Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles*

EN ISO 1182, *Reaction to fire tests for products — Non-combustibility test (ISO 1182)*

EN ISO 1716, *Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value) (ISO 1716)*

EN ISO 13943:2010*, Fire safety — Vocabulary (ISO 13943:2008)*

ISO 834-1, *Fire-resistance tests — Elements of building construction — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 45545-1:2013 apply.

4 Application of fire barriers

Railway vehicles shall be equipped with fire barriers at the locations specified in Table 1.

5 Classification, requirements and test procedures

5.1 General requirements

5.1.1 Introduction

The use of the following parameters shall be according to the principles described in EN 13501-2.

5.1.2 Integrity criterion E

The integrity shall be determined by two methods during the test:

— cracks or openings in excess of given dimensions;

— sustained flaming on the unexposed side.

The times of each mode of integrity failure shall be recorded.

5.1.3 Insulation criterion I

Heat transmission shall be limited so that neither the unexposed surface nor any material in close proximity to that surface is ignited. The product/element shall also provide a barrier to heat, sufficient to protect people near to it.

5.1.4 Radiation criterion W

A product/element that satisfies the insulation criterion I is also deemed to satisfy the W requirement for the same period.

5.2 Classification of fire barriers

Fire barriers shall have fire resistance properties verified by:

— a fire resistance test based on the principles of EN 1363-1, or

— assessment based on fire resistance testing.

Fire barriers shall have performance based on the three parameters (E, W, I) as specified in Table 1.

Barrier performance shall be designated for example as E 30, I 15, which means: integrity is maintained for 30 min and insulation is maintained for 15 min.

5.3 Arc barrier Type A

Type A arc barriers according to EN 45545-5 shall satisfy the requirements for an E15 fire barrier.

5.4 Arc barrier Type B

Type B arc barriers according to EN 45545-5 shall satisfy the requirements for an E60 fire barrier.

5.5 Requirements

5.5.1 General

The requirements for fire barriers depend upon the operation and design categories and their location in the railway vehicle.

The fire barriers shall be located as specified in Table 1. Examples of the barriers in Table 1 are described in Figure 1 to Figure 4.

All vertical fire barriers in the cross section of a railway vehicle shall cover the entire area between floor and roof. In this context, the middle floor of a double decked vehicle shall be considered as a floor for the upper deck and as a roof for the lower deck. Where a vertical barrier reaches the side wall, it shall be extended to the body shell.

Closing devices for ventilation ducts shall conform to the following requirements:

a) where a ventilation duct passes through a fire barrier, the duct shall have a closing device where it passes through the barrier unless the complete duct meets the same level of fire resistance requirements as the barrier either for its entire length, or for its length to the next fire barrier or closing device;

b) closing devices shall meet the same fire resistance requirements as fire barriers;

c) closing devices shall operate on reaction to a fire.

Penetrations through fire barriers, for example for ducts or cables, shall not reduce the fire resistance of the barrier.

Table 1 — Fire barrier requirements *(1 of 3)*

No	Fire origin	Protected location	Remarks	Operation category	Requirements
1	Underfloor technical cabinet containing electrical high power supply or traction circuits other than brake resistors	Passenger and staff area including driver's cab	Tested in accordance with EN 1364-2. Requirements are defined from underfloor to the top of the floor covering.	1, 2 and 4 3	E15 E15; I15
2	Underfloor traction transformers or reactors filled with insulation fluid	Passenger and staff area including driver's cab	Tested in accordance with EN 1364-2 Whole cross section and 1 m longer than the object on each longitude direction Requirements are defined from underfloor to the top of the floor covering	1 and 2 3 and 4	E15 E15; I15
3	Underfloor combustion engine (including heating equipment, fuel tank and pipe work)	Passenger and staff area including driver's cab	Tested in accordance with EN 1364-2 Whole cross section and 1 m longer than the object on each longitude direction Requirements are defined from underfloor to the top of the floor covering	1 and 2 3 and 4	E15 E15; I15
4	Underfloor area not covered by positions 1-3	Passenger and staff area including driver's cab	Tested in accordance with EN 1364-2 Requirements are defined from underfloor to the top of the floor covering	1 to 4	No requirement

Table 1 *(2 of 3)*

No	Fire origin	Protected location	Remarks	Operation category	Requirements
5	Passenger area	Adjacent passenger area	Tested in accordance with EN 1364-1 (walls) The full cross section shall be tested with all elements positioned as they would be present in an actual railway vehicle	1, 2, 4 3	No requirements E15 for the full cross section elements shall be located at a distance not exceeding 30 m from another full cross section element
6	Passenger area	Driver' s cab	Fire barriers are tested in accordance with EN 1364-1 (walls) and Clause 6 of this document The full cross section shall be tested with all elements positioned as they would be present in an actual railway vehicle	1 and 2; 4 3	No requirements E10; E15; I15 [a]
7	Inside the luggage container	Outside the luggage container	Tested in accordance with EN 1364-1 (walls)	1 to 4	E15

Table 1 *(3 of 3)*

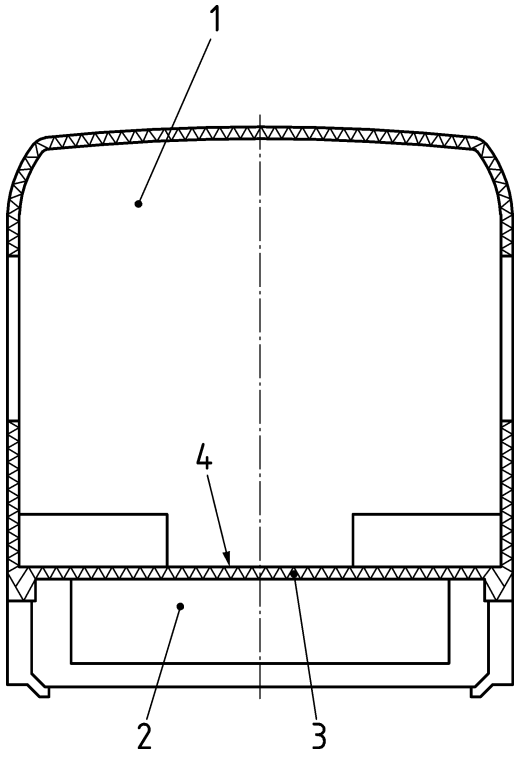
No	Fire origin	Protected location	Remarks	Operation category	Requirements
8	Luggage Compartments	Passenger and staff areas including driver's cab	Tested in accordance with EN 1364-1 (walls)	1 2 3	No requirement E15 E30
		All areas (including exteriors)		4	E30
9	Inside a technical cabinet located in the body shell which contains high power electrical equipment	Passenger and staff areas including driver's cab	Tested in accordance with EN 1364-1 (walls)	1, 2 and 4 3	E15 E15; I15
10	Inside a technical cabinet located in the body shell, which contains an internal combustion engine including heating equipment with tank and pipe work	Passenger and staff areas including driver's cab	Tested in accordance with EN 1364-1 (walls) The wall shall end on the roof body structure, if not the ceiling shall be tested in accordance with EN 1364-2	1 and 2 3 and 4	E15 E15; I15

[a] I15 is required for vehicles subject to the Directive 2008/57/EC. For other railway vehicles W15 is required instead of I15.

Requirements for the same element and the same operation categories, in different items are not cumulative.

5.5.2 Figures relating to Table 1

No	Fire origin	Protected location
1	Underfloor technical cabinet containing electrical high power supply or traction circuits other than brake resistors	Passenger and staff area including driver's cab



Key

1 protected location

2 fire origin

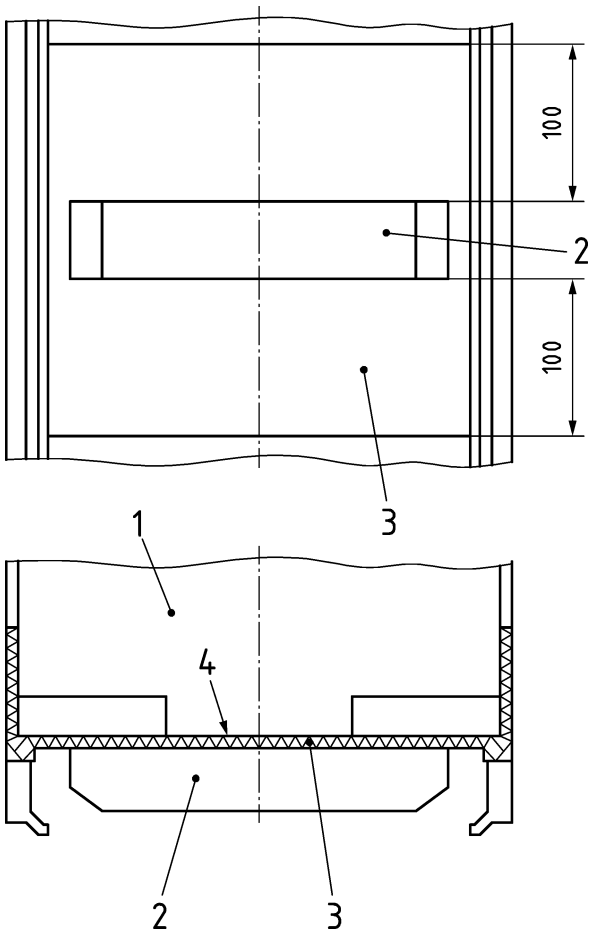
3 fire and type arc barrier

4 floor

Figure 1 — Example 1 for locations of fire barriers

No	Fire origin	Protected location
2	Underfloor traction transformers or reactors filled with insulation fluid	Passenger and staff area including driver's cab
3	Underfloor combustion engine (including heating equipment, fuel tank and pipe work)	Passenger and staff area including driver's cab

Dimensions in millimetres



Key

1 protected location

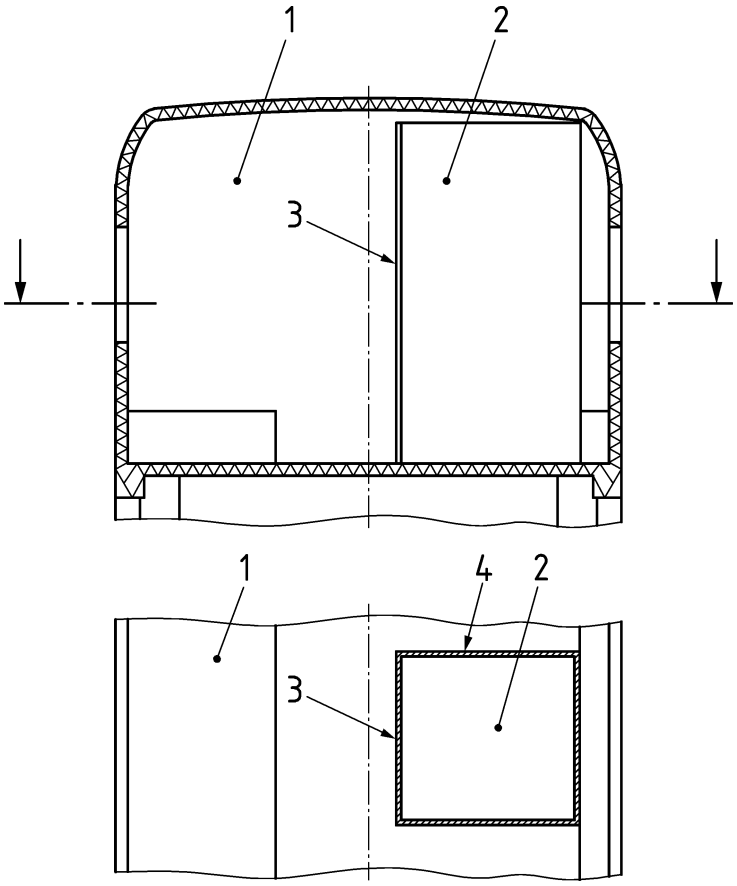
2 fire origin

3 fire barrier

4 floor

Figure 2 — Example 2 for locations of fire barriers

No	Fire origin	Protected location
9	Inside a technical cabinet located in the body shell which contains high power electrical equipment	Passenger and staff areas including driver's cab



Key

1 protected location

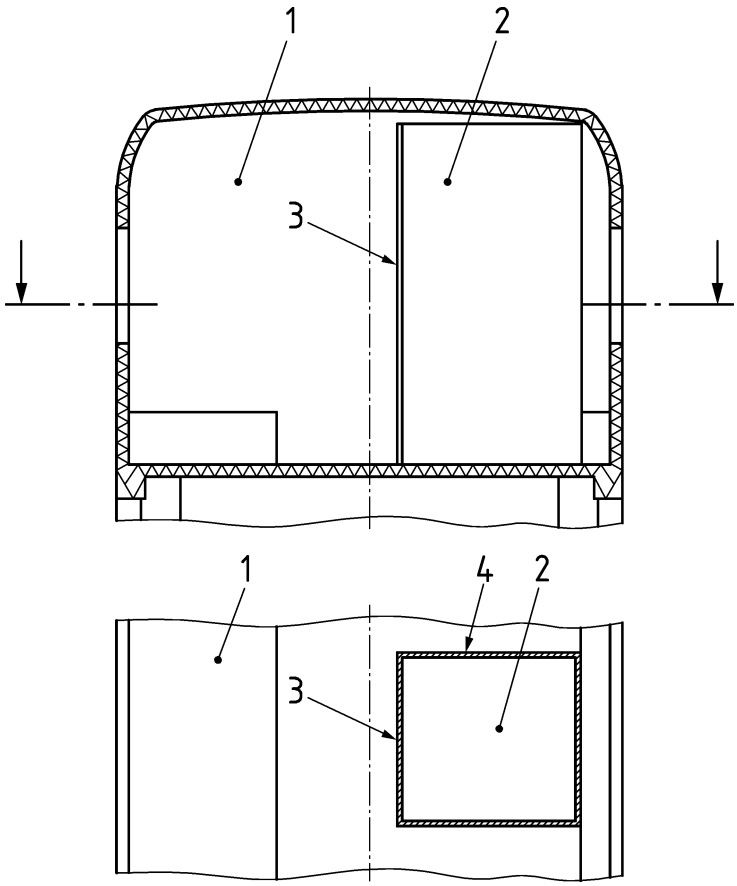
2 fire origin

3 fire barrier including doors

4 fire barrier included Type A arc barrier

Figure 3 — Example 3 for locations of fire barriers

No	Fire origin	Protected Location
10	Inside a technical cabinet located in the body shell, which contains internal combustion engine including heating equipment with tank and pipe work	Passenger and staff areas including driver's cab



Key

1 protected location

2 fire origin

3 fire barrier including doors

4 fire barrier included Type A arc barrier

Figure 4 — Example 4 for locations of fire barriers

5.6 Standard fire resistance tests

5.6.1 General

The fire resistance performance of fire barriers shall be determined using standard fire test procedures in accordance with the general requirements specified in EN 1363-1, which is technically related to ISO 834-1 and uses the same temperature-time curve for fire exposure.

The test specimen shall be representative of the complete fire barrier, including cut-outs, ducts, etc. Rules for mounting and fixing of the test specimens are given in Annex A. For unidirectional barriers, the test specimen shall be located such that the side, which will be exposed to fire on the train, is exposed to the test fire. For bi-directional barriers that are asymmetric, the test specimen shall be located so that the weaker of the two faces is exposed to the test fire. If it is not possible to establish the weaker face, the barrier shall be tested in both directions.

If the fire barrier represented by the test specimen is subject to structural stress, an equivalent test load shall be applied during the test in accordance with EN 1363-1. A simulation of the payload is not necessary in the fire resistance test.

5.6.2 Doors

Fire resistance testing of door assemblies shall be conducted according to EN 1634-1. Particular attention shall be paid to the door leaf perimeter clearance gaps and frame fittings. The test requirements of door assemblies shall be the same as for walls.

Fire barriers made of two doors (for example a pair of vehicle body ends) separated by a distance of less than 1 m can be tested as a single test specimen and considered as a single fire barrier.

5.6.3 Non standard fire resistance tests

Most standard fire resistance tests are carried out on furnaces with openings of 3 m × 3 m. However, for components where there is no influence of geometry on the test result (e.g. cable penetrations), indicative tests may be carried out in smaller furnaces with a minimum opening size of 450 mm × 450 mm. When conducting tests on this smaller scale, test specimens shall be constructed to simulate end-use application conditions as closely as possible and the test shall be performed according to the principles of EN 1363-1.

5.6.4 Conventional classified products

Table 2 lists accepted fire resistance performance classifications of some typical fire barrier products used in railway vehicles.

Table 2 — Typical fire resistance performance of some fire barrier products

Description of product and/or design	Performance
Steel sheet, 2 mm thick	E60
Steel sheet, 2 mm thick, with 50 mm thick mineral fibre insulation	E60, I15
Aluminium sheet, 3 mm thick (non insulated on cold face)	E10
Aluminium sheet, 5 mm thick (non insulated on cold face)	E15
Aluminium sheet, 3 mm thick, with 30 mm mineral fibre insulation on the hot face	E30

6 Evaluation of conformity

See EN 45545-1.

Annex A
(normative)

Requirements for mounting and fixing of test specimens

A.1 General

This annex specifies guidance rules for the mounting and fixing of railway vehicle products in the fire resistance standards EN 1363-1, EN 1364-1, EN 1364-2 and EN 1365-2, which are referred to in the classification standard EN 13501-2. The mounting and fixing rules are intended to ensure that the fire resistance results in these tests are representative of the product behaviour in one or more end-use applications when exposed to a developed fire in the relevant fire scenario on the railway vehicle.

In the absence of standard mounting and fixing rules, a test result is only valid for the direct field of application of the test results. As a consequence, all other end-use applications have to be tested. EN 13501-2 and the test standards contain some aspects of standardised mounting and fixing, which to some degree limit the number of tests that have to be conducted to classify a product.

A.2 Terms and definitions

For the purposes of this annex, the terms and definitions given in EN ISO 13943:2010 and the following apply.

A.2.1
restraint
constraint to expansion or rotation (induced by thermal and/or mechanical actions) that is provided by the ends, edges or supports of a test specimen

A.2.2
supporting structure
structure that may be required for the testing of some structural elements into which the test specimen is assembled; e. g. the wall into which a door or window is fitted

A.2.3
test construction
complete assembly of the test specimen together with its supporting structure

A.2.4
test frame
frame containing the test construction for the purpose of mounting onto the furnace

A.2.5
test specimen
railway vehicle element provided for the purpose of determining either its fire resistance or its contribution to the fire resistance of another railway vehicle element

A.3 Product parameters and end-use application parameters

Standardised mounting and fixing instructions are based on the principle that the performance in such an assembly is equal to or lower than that in the end-use application. The following product and end-use application parameters shall be taken into account:

— thickness;

— density;

— surface coating;

— composition of product;

— geometry and structure, such as layers;

— substrate;

— method of fixing;

— type and position of joints;

— air gaps;

— product orientation.

Parameters may be neglected if it can be demonstrated that they have no effect on the fire resistance or if they are not relevant for the product under consideration.

A.4 Restraint and boundary conditions

The test specimen may be mounted in a supporting construction designed to reproduce the required conditions or the design boundary and support conditions. The type of test frame and the performance required from it will vary according to the element being tested.

For example, EN 1364-1 (walls) states that, if the test specimen is not larger than the front opening of the furnace (typically 3 m $\times$ 3 m for wall specimens), then the edges of the test specimen shall be restrained as in practice. Where in practice the width of the construction is larger than the front opening of the furnace, one vertical edge shall be left unrestrained and there shall be a gap of 25 mm to 50 mm between the free edge of the test specimen and the test frame. This gap shall be packed with a resilient non-combustible material (e.g. mineral fibre) to provide a seal without restricting freedom of movement. The remaining edges shall be restrained as in end-use.

A.5 Size of test specimen

The specimen size shall be in accordance with the specific fire barrier requirements detailed in Table 1.

For indicative tests (e.g. to check on parameter variations), a furnace with minimum opening dimensions of 1 m by 1 m shall be used together with the appropriate temperature-time curve used in the reference test.

A.6 Number of test specimens

For fire barriers that are only required to be fire resisting from one side, one specimen shall be tested with the exposed face being the side that will be subject to fire attack.

For fire barriers that are required to be fire resisting from both sides, two specimens shall be tested separately (one from each direction) unless the fire barrier is fully symmetrical and the required fire exposure conditions for both directions are identical.

NOTE Different boundary conditions can require additional specimens to be tested.

A.7 Construction of test specimens and verification

The method of construction shall be representative of the way in which the fire barrier is used on railway vehicles. The constructor shall provide a description of all constructional details, drawings and an assembly procedure to the test laboratory prior to the test. Additional details concerning responsibilities of specimen verification are given in EN 1363-1.

A.8 Installation of test specimen

The test specimen shall be installed as closely as possible to the way in which the fire barrier is fitted in actual railway vehicles.

Any modifications made to accommodate the installation of a test specimen within the test frame shall be such as to have no significant influence on the fire behaviour of the test specimen and shall be fully described in the test report.

When the test specimen is in a form of construction not covered by the standard supporting constructions detailed in EN 1363-1, it shall whenever possible be tested within the supporting construction in which it is to be used.

A.9 Conditioning of test specimen

EN 1363-1:2012, Clause 8, gives rules concerning the conditioning of test specimens. When a test specimen is mounted within a supporting construction, full conditioning of the supporting construction may not be necessary if it can be demonstrated that there will be no influences on the behaviour of the test specimen caused by excessive moisture.

A.10 Joint construction

Small variations in joint construction can affect the integrity of test specimens. Variations shall not be allowed with the following exceptions:

— an increase in overlapping is allowed if other dimensions remain unchanged;

— an increase in number of fixings is allowed;

— joints tested without sealants can be sealed on the fire- exposed side of a fire barrier. For structures with only an E classification, non-combustible sealants as determined by EN ISO 1182 or EN ISO 1716 may be used on the non-exposed side if tested without sealants;

— if a construction is tested with sealing materials in the joints, test results are valid only for joints with the same type of sealing materials and are not valid for joints without sealants.

Annex ZA
(informative)

Relationship between this European standard and the Essential Requirements of EU Directive 2008/57/EC

This European Standard has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the Directive 2008/57/EC[1)].

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 for HS Rolling Stock, Table ZA.2 for CR Locomotives and Passenger Rolling Stock and Table ZA.3 for the HS/CR TSI Safety in Rail Tunnel, confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard, the HS TSI RST published in the OJEU dated 26 March 2008 and Directive 2008/57/EC

Clause/ sub-clauses of this European Standard	Chapter/§/annexes of the TSI	Corresponding text, articles/§/annexes of the Directive 2008/57/EC	Comments
The whole standard applies	4. Characterisation of the subsystem 4.2 Functional and technical specification of the subsystem 4.2.7 System protection § 4.2.7.2.1 Introduction § 4.2.7.2.3.3 Fire resistance Annex E – Table E1-§4.2.7.2 Fire safety	Annex III, Essential requirements 1 General requirements 1.1 Safety Sub-clauses 1.1.1, 1.1.3, 1.1.4 1.3 Health Clause 1.3.2 1.4 Environmental protection Sub-clause 1.4.2 2 Requirements specific to each subsystem 2.4 Rolling stock 2.4.1 Safety §8 2.4.2 Reliability and availability	Operation category 2 and 3, as I15 defined in 5.2.1 and 5.2.2 of EN 45545-1:2013, correspond respectively to the Category A and B Fire safety of the HS-RST-TSI. The full cross section elements shall be located at a distance not exceeding 30 m from another full cross section element in the EN instead of 28 m in the TSI. This value is updated in the EN according to the design of vehicles produced today.

1) This Directive 2008/57/EC adopted on 17th June 2008 is a recast of the previous Directives 96/48/EC 'Interoperability of the trans-European high-speed rail system' and 2001/16/EC 'Interoperability of the trans-European conventional rail system' and revisions thereof by 2004/50/EC 'Corrigendum to Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system'

Table ZA.2 – Correspondence between this European Standard, the CR LOCO&PAS RST TSI published in the OJEU on 26 May 2011 and Directive 2008/57/EC

Clause/ sub-clauses of this European Standard	Chapter/§/annexes of the TSI	Corresponding text, articles/§/annexes of the Directive 2008/57/EC	Comments
The whole standard applies	4.Characterisation of the Rolling stock subsystem 4.2 Functional and technical specifications of the subsystem 4.2.10 Fire safety and evacuation § 4.2.10.1 General and categorisation § 4.2.10.5 Fire barriers	Annex III, Essential requirements 1 General requirements 1.1 Safety Sub-clauses 1.1.1, 1.1.3, 1.1.4 1.3 Health Sub-clause 1.3.2 1.4 Environmental protection Sub-clause 1.4.2 2 Requirements specific to each subsystem 2.4 Rolling stock 2.4.1 Safety §8 2.4.2 Reliability and availability	Operation category 2 and 3, as defined in 5.2.1 and 5.2.2 of EN 45545-1:2013, correspond respectively to the Category A and B Fire safety and evacuation of the TSI. The full cross section elements shall be located at a distance not exceeding 30 m from another full cross section element in the EN instead of 28m in the TSI. This value is updated in the EN according to the design of vehicles produced today.

Table ZA.3 – Correspondence between this European Standard, the SRT TSI published in the OJEU dated 7 March 2008 and Directive 2008/57/EC

Clause/ sub-clauses of this European Standard	Chapter/§/annexes of the TSI	Corresponding text, articles/§/annexes of the Directive 2008/57/EC	Comments
The whole standard applies	4.Characterisation of the subsystem 4.2 Functional and technical specifications of the subsystem 4.2.5. Subsystem rolling stock 4.2.5.3. Fire protection for freight trains §4.2.5.3.2 Driver's protection 4.2.5.4. Fire barriers for passenger rolling stock	Annex III, Essential requirements 1 General requirements 1.1 Safety Sub-clauses 1.1.1, 1.1.3, 1.1.4 1.3 Health Sub-clause 1.3.2 1.4 Environmental protection Sub-clause 1.4.2 2 Requirements specific to each subsystem 2.4 Rolling stock 2.4.1 Safety §8 2.4.2 Reliability and availability	Operation category 2 and 3, as defined in 5.2.1 and 5.2.2 of EN 45545-1:2013, correspond respectively to the Category A and B Fire safety of the TSI. The full cross section elements shall be located at a distance not exceeding 30 m from another full cross section element in the EN instead of 28 m in the TSI. This value is updated in the EN according to the design of vehicles produced today.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] 2008/57/EC, Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community.

[2] 2008/232/EC, Commission Decision of 21 February 2008 concerning the technical specification for interoperability relating to the rolling stock subsystem of the trans-European high-speed rail system referred to in Article 6(1) of Directive 96/48/EC.

[3] 2011/291/EU, Commission Decision of 26 April 2011 concerning a technical specification for interoperability relating to the rolling stock subsystem — 'Locomotives and passenger rolling stock' of the trans-European conventional rail system.

[4] EN 1365-2, *Fire resistance tests for loadbearing elements — Part 2: Floors and roofs*

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