NSAI Standards

Standard Recommendation
S.R. CEN/TS 45545-2:2009

Railway applications - Fire protection on railway vehicles -- Part 2: Requirements for fire behaviour of materials and components

S.R. CEN/TS 45545-2:2009

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Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behaviour of materials and components

Applications ferroviaires - Protection contre les incendies dans les véhicules ferroviaires - Partie 2 : Exigences du comportement au feu des matériaux et des composants

Bahnanwendungen - Brandschutz in Schienenfahrzeugen - Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten

This Technical Specification (CEN/TS) was approved by CEN on 9 June 2008 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN/CENELEC will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Foreword

This document (CEN/TS 45545-2:2009) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

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 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(s).

For relationship with EC Directive(s), see informative Annex ZA, which is an integral part of this document.

This series of Technical Specifications *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 organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This part is based on 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 CEN/TS 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 specifies the reaction to fire performance requirements for materials and products used on railway vehicles as defined in CEN/TS 45545-1.

The operation and design categories defined in CEN/TS 45545-1 are used to establish hazard levels that are used as the basis of a classification system.

For each hazard level, this part specifies the test methods, test conditions and reaction to fire performance requirements.

It is not within the scope of this Technical Specification to describe measures that ensure the preservation of the vehicles in the event of a fire.

2 Normative references

The following referenced documents are indispensable for the application 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 13238, *Reaction to fire tests for building — Conditioning procedures and general rules for selection of substrates*

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

CEN/TS 45545-1, *Railway applications — Fire protection on railway vehicles — Part 1: General*

CEN/TS 45545-3:2009, *Railway applications — Fire protection on railway vehicles — Part 3: Fire resistance requirements for fire barriers*

EN 50266-2-4, *Common test methods for cables under fire conditions — Test for vertical flame spread of vertically-mounted bunched wires or cables — Part 2-4: Procedures; Category C*

EN 50305:2002, *Railway applications — Railway rolling stock cables having special fire performance — Test methods*

EN 60332-1-2, *Tests on electric and optical fibre cables under fire conditions — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable — Procedure for 1 kW pre-mixed flame (IEC 60332-1-2:2004)*

EN 60584-1, *Thermocouples — Part 1: Reference tables (IEC 60584-1:1995)*

EN 61034-1, *Measurement of smoke density of cables burning under defined conditions — Part 1: Test apparatus (IEC 61034-1:2005)*

EN 61034-2, *Measurement of smoke density of cables burning under defined conditions — Part 2: Test procedure and requirements (IEC 61034-2:2005)*

EN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716:2002, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 4589-2, *Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient-temperature test (ISO 4589-2:1996)*

EN ISO 5659-2, *Plastics — Smoke generation — Part 2: Determination of optical density by a single-chamber test (ISO 5659-2:2006)*

EN ISO 6507-3, *Metallic materials — Vickers hardness test — Part 3: Calibration of reference blocks (ISO 6507-3:2005)*

EN ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2002)*

EN ISO 11925-2, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 2: Single-flame source test (ISO 11925-2:2002)*

EN ISO 12952-3, *Textiles — Burning behaviour of bedding items — Part 3: General test methods for the ignitability by a small open flame (ISO 12952-3:1998)*

EN ISO 12952-4, *Textiles — Burning behaviour of bedding items — Part 4: Specific test methods for the ignitability by a small open flame (ISO 12952-4:1998)*

EN ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

ISO 5658-2:2006, *Reaction to fire tests — Spread of flame — Part 2: Lateral spread on building and transport products in vertical configuration*

ISO 5660-1, *Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method)*

ISO/TR 9705-2, *Reaction-to-fire tests — Full-scale room tests for surface products — Part 2: Technical background and guidance*

ISO 11054, *Cutting tools — Designation of high-speed steel groups*

ISO 19702, *Toxicity testing of fire effluents — Guidance for analysis of gases and vapours in fire effluents using FTIR gas analysis*

IEC/TS 60695-1-40, *Fire hazard testing — Part 1-40: Guidance for assessing the fire hazard of electrotechnical products — Insulating liquids*

NF X70-100-1, *Fire tests — Analysis of gaseous effluents — Part 1: methods for analysing gases stemming from thermal degradation*

NF X70-100-2, *Fire tests — Analysis of gaseous effluents — Part 2: tubular furnace thermal degradation method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Definition of parameters

3.1.1
average rate of heat emission at time *t*
ARHE
cumulative heat emission from t = 0 to t = t divided by t

ARHE is generated as follows:

Given that the rate of heat emission data comprises pairs of data points where the first data point is (t_1 q) where t is the time and q is the rate of heat emission, ARHE is given by (using a trapezoidal area assumption):

$$ARHE(t_n) = \frac{\sum_{2}^{n} (t_n - t_{n-1}) X \frac{\dot{q}_n + \dot{q}_{n-1}}{2}}{t_n - t_{n-1}}$$

Generally t_1 = 0 and q_1 = 0, or at least can be rescaled to meet this condition; the expression above can be further simplified.

The heat emission for each time element (h_n) is calculated assuming a scan rate at 2 s for burns of less than 3 min and at 5 s for longer burn times (ISO 5660-1). The first heat element is obtained from data points 1 and 2 and assigned to data point 2 as h2: