RAUDTEEALASED RAKENDUSED. RAUDTEEVEEREMI TULEOHUTUS. OSA 2: NÕUDED MATERJALIDE JA KOMPONENTIDE KÄITUMISELE

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

EESTI STANDARDIKESKUS
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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 45545-2:2020 sisaldab Euroopa standardi EN 45545-2:2020 ingliskeelset teksti.	This Estonian standard EVS-EN 45545-2:2020 consists of the English text of the European standard EN 45545-2:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 05.08.2020.	Date of Availability of the European standard is 05.08.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EN 45545-2

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English Version

Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behavior 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 European Standard was approved by CEN on 22 June 2020.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 45545-2:2020) 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 February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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

This document supersedes EN 45545-2:2013+A1:2015.

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.

The main changes from EN 45545-2:2013+A1:2015 are:

— **integration of the new test standards:**

  — deletion of Annexes A and B and reference to EN 16989;

  — now, EN 16989 is given in Clause 2, Normative references;

  — in Table 2, EN 16989 appears for F1 product;

  — in Table 5, modification of R18 requirement to be in accordance with EN 16989;

  — in Table 5, adding of footnote d to be in accordance with EN 16989;

  — deletion of Annex C and reference to EN 17084;

  — now, EN 17084 is given in Clause 2, Normative references;

  — in Table 5, EN 17084 is now the reference instead of EN ISO 5659-2 : 50 kWm^{-2} for the parameter CIT_G;

  — in Clause 2, Normative references, new standards appear:

- EN 16989, *Railway applications — Fire protection on railway vehicles — Fire behaviour test for a complete seat*;
- EN 17084, *Railway applications — Fire protection on railway vehicles — Toxicity test of materials and components*;
- EN 60695-1-40, *Fire hazard testing — Part 1-40: Guidance for assessing the fire hazard of electrotechnical products — Insulating liquids (IEC 60695-1-40)*;

— and standards were deleted:

- EN 60584-1, *Thermocouples — Part 1: Reference tables*;
- EN ISO 6507-3, *Metallic materials — Vickers hardness test — Part 3: Calibration of reference blocks (ISO 6507-3)*;
- 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*;
- 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*;

— in Clause 3, Terms and definitions, adding of :

- 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

— **some initial changes based on the return of experience:**

— 4.2.a, adding of « laminated glass where the internal organic layers are not exposed and the percentage mass of organic material is less than or equal to 6 %. »;

— 4.2.e, modification « a product, other than an electric cable:

- meeting a requirement at two different thicknesses with identical formulation and density (of each layer), shall be considered to comply with the requirement at all intermediate thicknesses. A product meeting a requirement at the maximum testable thickness shall be considered to comply with the requirement at greater thicknesses;
- meeting a requirement at two different densities, shall be considered to comply with the requirement at all intermediate densities. The material with a differing density shall have identical formulation and thickness. »;

— 4.2.g, adding of « or with substrates representative of the end use condition in accordance with 5.3 »;

— 4.2.h, adding of two new bullet points:

  — the technical cabinet contains only mechanical or low power electrical equipment. The cabinet sheets are closed and made of aluminium, steel or glass. The enclosed volume is ≤ 0,1 m^3. Covered openings (e.g. by connectors or switches) are acceptable;

  — the technical cabinet sheet material is made of aluminium or steel and the enclosed volume is ≤ 0,5 m^3. For any individual surface of the cabinet, the total area of all openings in that surface shall be less than 1/1000 of the nominal surface area;

— 4.2.j, modification « for organic coatings applied to non-metallic surfaces, the full specified test requirements of chapters 4.3 till 4.5 are mandatory; »

— 4.2.k, modification « for organic coatings applied to products conforming to 4.2 a), ISO 5658-2 or EN ISO 9239-1 flame spread tests shall be carried out, but other test requirements such as heat release, smoke emission and toxic gas emission tests are not required if the nominal coating thickness, including any surfacing filler for exterior products is < 0,3 mm, or for interior products the nominal thickness of organic coating is < 0,15 mm; »

— 4.3 : modifications:

  4.3.1 General

  Products compliant to Table 2 or Table 3 are excluded from the grouping assessment.

  No requirements apply to products with a combustible mass of ≤ 10g in touching contact only with a product compliant to Table 2 and Table 3.

  To assess products within the grouping rules the following parameters have to be considered.

  Products shall be assessed within the grouping rules if:

  — the exposed area of each product is ≤ 0,2 m^2; and

  — the combustible mass of each product is > 10 g or they are in touching contact with another unclassified combustible product; and

  — the horizontal distance is ≤ 20 mm and the vertical distance is ≤ 200 mm to a combustible product not assessed to Table 2, Table 3 or R24 according to rule 2; and

  — they are not fully separated by a product compliant with the fire integrity requirement of 5.3.7.

  The combustible masses of the products in this group shall be summed. The assessment process described in 4.3.2 to 4.3.4 is visualized in the flow chart in Figure 1.

  4.3.2 Rule 1

  If the total combustible mass of the grouped products is

  — ≤ 100 g for interior grouped products;

  or

— ≤ 400 g for exterior grouped products;

no requirements apply to the products of this group.

This principle also applies to single products that meet the requirements of 4.3.1.

4.3.3 Rule 2

If the total combustible mass of the grouped products exceeds the limits stated in Rule 1, but

— ≤ 500 g for interior grouped products;

or

— ≤ 2000 g for exterior grouped products;

one combustible product of this group has to be tested according to R24.

If this product is compliant to R24 it shall not be considered for further assessment of this group. The remaining products in this group shall be assessed starting with 4.3.1 again.

This principle also applies to single products that exceed the mass limits of Rule 1.

4.3.4 Rule 3

If the combustible mass of the grouped products exceed the limits stated in Rule 2, one product of the group shall be tested according to the requirements of non-listed products given in 4.5, Table 3.

If this product is compliant to the requirements of Table 3 it shall not be considered for further assessment of this group. The remaining products in this group shall be assessed starting with 4.3.1.

This principle also applies to single products that exceed the mass limits of Rule 2;

— the flow chart given in Figure 1 is modified to be consistent with the text of 4.3;

— 4.4: listed products is now containing 28 requirements;

— in Table 5, requirement R27 is new and applied for EX13 products (new category defined in Table 2);

— in Table 5, requirement R28 is new and applied with 5.3.1.2;

— in Table 5, new requirement is given for EL9 products : R24 or R25 or R26;

— in Table 2, EL10 products are now named « low power electro technical and electronic products »;

— in Table 5, add of footnotes b, c and d;

— adding of a note below Table 5 to introduce new Annex B;

— in Table 6, modification of standards references as explained in Clause 2, Normative references, in particular :

  — in Table 6, modification of T06.01 to be in accordance with EN 16989;

  - in Table 6, add of T06.02 to be in accordance with EN 16989;
  - in Table 6, add of T06.03 to be in accordance with EN 16989;
  - in Table 6, modification of T11.01 to be in accordance with EN 17084;
  - in Table 6, modification of T11.02 to be in accordance with EN 17084;
  - in Table 6, modification of T12 to be in accordance with EN 17084;
- 5.2.2 modification to be in accordance with EN 16989;
- 5.3.2 modification of the paragraph;
- 5.3.3 adding of this paragraph;
- 5.3.4 adding of this paragraph;
- Annex A is the previous Annex D;
- Annex B is new and presents a product classification guidance;
- **editorial changes due to the revision:**
  - Introduction;
  - European Foreword;
  - Annex ZA;
  - Bibliography.

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 Directive (EU) 2016/797.

For relationship with Directive (EU) 2016/797, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

EN 45545-2 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 document specifies the reaction to fire performance requirements for materials and products used on railway vehicles as defined in EN 45545-1.

The operation and design categories defined in EN 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 document to describe measures that ensure the preservation of the vehicles in the event of a fire.

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 13238:2010, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

EN 13501-1:2018, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 16989:2018, *Railway applications - Fire protection on railway vehicles - Fire behaviour test for a complete seat*

EN 17084:2018, *Railway applications - Fire protection on railway vehicles - Toxicity test of materials and components*

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

EN 45545-3:2013, *Railway applications - Fire protection on railway vehicles - Part 3: Fire resistance requirements for fire barriers*

EN 45545-5:2013+A1:2015, *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 50264:2008 (series), *Railway applications — Railway rolling stock power and control cables having special fire performance*

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

EN 50306:2002 (series), *Railway applications — Railway rolling stock cables having special fire performance*

EN 50382:2008 (series), *Railway applications — Railway rolling stock high temperature power cables having special fire performance*

EN 60332-1-2:2004, *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*

EN IEC 60332-3-24:2018, *Tests on electric and optical fibre cables under fire conditions — Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category C (IEC 60332-3-24)*

EN 60695-1-40:2014, *Fire hazard testing - Part 1-40: Guidance for assessing the fire hazard of electrotechnical products - Insulating liquids*

EN 60695-2-11:2014, *Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products (GWEPT) (IEC 60695-2-11:2014)*

EN 60695-11-10:2013, *Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods (IEC 60695-11-10:2013)*

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

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

EN ISO 1182:2010, *Reaction to fire tests for products - Non-combustibility test (ISO 1182:2010)*

EN ISO 1716:2018, *Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2018)*

EN ISO 4589-2:2017, *Plastics - Determination of burning behaviour by oxygen index - Part 2: Ambient-temperature test (ISO 4589-2:2017)*

EN ISO 5659-2:2017, *Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test (ISO 5659-2:2017)*

EN ISO 9239-1:2010, *Reaction to fire tests for floorings - Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2010)*

EN ISO 11925-2:2010, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2010)*

EN ISO 12952-2:2010, *Textiles - Assessment of the ignitability of bedding items - Part 2: Ignition source: match-flame equivalent (ISO 12952-2:2010)*

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

ISO 5660-1:2015, *Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement)*

3 Terms and definitions

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