

SVENSK STANDARD

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Järnvägar – Järnvägsfordons brandsäkerhet – Del 5: Brandsäkerhetsfordringar på elutrustning i järnvägsfordon, trådbussar, spårbussar och magnetsvävare

**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**

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EUROPEAN STANDARD

EN 45545-5:2013+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2015

ICS 13.220.20; 45.060.01

Supersedes EN 45545-5:2013

English Version

**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**

Applications ferroviaires - Protection contre les incendies dans les véhicules ferroviaires - Partie 5: Exigences de sécurité incendie pour l'équipement électrique, y compris celui des trolleybus, des autobus guidés et des véhicules à sustentation magnétique

Bahnanwendungen - Brandschutz in Schienenfahrzeugen - Teil 5: Brandschutzanforderungen an die elektrische Ausrüstung einschließlich der von Oberleitungsbussen, spurgeführten Bussen und Magnetschwebfahrzeugen

This European Standard was approved by CEN on 10 December 2012 and includes Amendment 1 approved by CEN on 14 August 2015.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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SS-EN 45545-5:2013+A1:2018 (E)

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European foreword

This document (EN 45545-5:2013+A1:2015) 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of an identical text or by endorsement, at the latest by April 2016, and conflicting national standards shall be withdrawn at the latest by April 2016.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 includes Amendment 1 approved by CEN on 2015-08-14.

This document supersedes A1 EN 45545-5:2013 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under a mandate given to CENELEC 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 organizations 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.

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Introduction

This European Standard 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 the different parts of EN 45545 will take into account the current operating conditions for European public rail transport.

1 Scope

This Part of EN 45545 specifies the fire safety requirements for electrical equipment on railway vehicles, including that of trolley buses, track guided buses and magnetic levitation vehicles.

The measures and requirements, specified in this European Standard meet the objective of protecting passengers and staff in railway vehicles in the event of a fire on board by:

- lowering the risk of starting a fire both during operation and as a result of technical defect and/or malfunction of the electrical equipment,
- ensuring that electrical emergency equipment continues to be functional until evacuation is complete (see EN 45545-6).

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

A1 EN 45545-2:2013+A1:2015 **A1**, *Railway applications — Fire protection on railway vehicles — Part 2: Requirements for fire behavior of materials and components*

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

EN 45545-4, *Railway applications — Fire protection on railway vehicles — Part 4: Fire safety requirements for rolling stock design*

EN 45545-6, *Railway applications — Fire protection on railway vehicles — Part 6: Fire control and management systems*

EN 50124-1, *Railway applications - Insulation coordination — Part 1: Basic requirements — Clearances and creepage distances for all electrical and electronic equipment*

EN 50125-1, *Railway applications — Environmental conditions for equipment — Part 1: Equipment on board rolling stock*

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

EN 50343, *Railway applications — Rolling stock — Rules for installation of cabling*

A1 EN 50547, *Railway applications — Batteries for auxiliary power supply systems* **A1**

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

3 Terms and definitions

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

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4 General requirements

The electrical design requirements used for railway vehicles are supplemented by the design requirements of this European Standard.

In addition to the design requirements of this European Standard, electrical equipment shall be designed to withstand the mechanical, electrical and thermal stresses which are likely to be encountered in operation (see EN 50125-1).

The requirements for cabling and integrity of connection are specified in EN 50343.

The requirements for fire behaviour properties of materials are specified in EN 45545-2.

5 Design requirements

5.1 Overload protection

When selecting the method and setting of overload protection to be installed between the current collectors and current consumers of a railway vehicle, consideration shall be given to the following:

- values of the short circuit currents;
- duration of these short circuit currents;
- any load side components which may modify the fault characteristics, e. g. the main filter reactor in a traction converter;
- characteristics of the power supply and its protection devices.

Where neither pole of the power supply is bonded to earth, the overload protection shall be on both poles of the supply line (e. g. trolley buses).

When selecting the method and settings of other overload protection devices (e.g. fuses and circuit breakers) consideration shall be given to the following:

- the normal load;
- line impedance;
- source impedance;
- short circuit characteristics;
- breaking capability of the overload protection device.

The unprotected parts of circuits shall be as short as possible; this shall be achieved by ensuring that protective devices and transducers for protective devices are installed as close as possible to the source of supply.

Precautions shall be taken to prevent a protective device from reclosing on to a known fault, where the electrical equipment is not capable of withstanding the fault current.

Precautions may be:

- preferably fault detection equipment design;
- operation instruction.

5.2 Cabling

High power cables shall be contained in a metallic duct or a metallic conduit earth bonded to the body if they are running:

- behind or inside walls;
- below floors or above ceilings of passenger or staff areas;
- or if they are passing in or through ventilation ducts, which are connected to passenger or staff areas.

Where the line supply protection device cannot be relied upon to operate within 250 ms after the occurrence of a fault, a device (arc extinguishing device) shall be fitted which can prevent progression of the arc through it along the line supply cable(s).

Any cable, where reliance can be placed on the line supply protection device, and any cable that is protected by an arc extinguishing device, shall either be:

- additionally insulated from the body or underframe to reduce the probability of short circuit arcing initiated by mechanical damage;
- or placed in a metallic tube or a metallic conduit which is earth bonded to the body of the railway vehicle to reduce the probability of mechanical damage and to ensure the operation of the line supply protection device.

These requirements do not apply to flexible connecting cables between body and bogies, but an arc extinguishing device may be fitted at any position in the cabling.

If the arc extinguishing device is based on an arc resisting material then this material should typically be a Type B arc barrier material.

Precautions shall be taken to ensure that vibration, thermal cycling, expansion/contraction and flexing do not cause damage to cabling and that mechanical stress is not transmitted to connections.

5.3 Electrical arc protection devices

5.3.1 Arc splash barrier

An arc splash barrier is a device to offer protection against incandescent metal particles arising from making and/or breaking high power electrical contacts.

The material properties are defined as listed product E3C in Table 2 of [EN 45545-2:2013+A1:2015](#).

5.3.2 Arc barrier Type A

A type A arc barrier is a device to contain an electrical arc of short duration, resulting from the normal operation of high power equipment, within a prescribed region.

The material properties are defined as listed product E3A in Table 2 of [EN 45545-2:2013+A1:2015](#).

The fire resistance is defined as E15 in 5.3 of EN 45545-3:2013.

5.3.3 Arc barrier Type B

A type B arc barrier is a device to contain an electrical arc, resulting from a failure of high power equipment, within a prescribed region.