

# SLOVENSKI STANDARD

## SIST-TS CLC/TS 45545-5:2009

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

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Application ferroviaires - Protection contre les incendies dans les véhicule 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

**Ta slovenski standard je istoveten z: CLC/TS 45545-5:2008**

### ICS:

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| 45.060.01 | Železniška vozila na splošno | Railway rolling stock in general |

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TECHNICAL SPECIFICATION  
SPÉCIFICATION TECHNIQUE  
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**CLC/TS 45545-5**

December 2008

ICS 13.220.20; 45.060.01

Supersedes CLC/TS 45545-5:2004

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 Magnetschwebefahrzeugen

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This Technical Specification was approved by CENELEC on 2008-06-13.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

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## CEN/CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This Technical Specification CLC/TS 45545-5, prepared by the Joint Working Group "Fire Safety in Railways" of CEN/TC 256 "Railway Applications" in cooperation with CENELEC/TC 9X "Electrical and electronic application for railways" was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was approved by CENELEC as CLC/TS 45545-5 on 2008-06-13.

This Technical Specification supersedes CLC/TS 45545-5:2004.

The following date was fixed:

- latest date by which the existence of the CLC/TS  
has to be announced at national level (doa) 2009-02-11

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

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## Contents

|  |    |
|--|----|
| Introduction .....   | 4  |
| 1 Scope .....  | 4  |
| 2 Normative references.....  | 4  |
| 3 Definitions .....  | 5  |
| 4 Terminology.....   | 6  |
| 5 General requirements.....  | 6  |
| 6 Design requirements .....  | 7  |
| 6.1 Overload protection .....  | 7  |
| 6.2 Integrity of connection .....  | 7  |
| 6.3 Wiring .....   | 7  |
| 6.4 Enclosures.....  | 8  |
| 6.5 Cable ducts .....  | 8  |
| 6.6 Batteries and battery supply circuits.....   | 9  |
| 6.7 Switchgear.....  | 9  |
| 6.8 Electrical emergency equipment .....   | 9  |
| 6.9 Bonding .....  | 9  |
| 6.10 Resistors and heating equipment.....  | 10 |
| 6.11 Locations exposed to current collection arcing .....  | 10 |
| 6.12 Forced ventilated equipment (including heating, cooling and air conditioning).....                                | 10 |
| 6.13 Container filled with insulating liquid.....  | 10 |
| 7 Maintainability.....   | 10 |
| 7.1 Maintenance requirements.....  | 10 |
| 7.2 Modification of electrical equipment .....   | 10 |
| 8 Evaluation of conformity.....  | 11 |
| Annex A (informative) Example of a system test for the evaluation of arc barriers<br>& arc extinguishing devices ..... | 12 |
| A.1 Health & safety warning.....   | 12 |
| A.2 Scope .....  | 12 |
| A.3 Definitions.....   | 13 |
| A.4 Key system test parameters.....  | 13 |
| A.5 A system test.....   | 13 |
| A.6 System test options .....  | 16 |

## Introduction

This Technical Specification 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 the different parts of the CEN/TS 45545 will take into account the current operating conditions for European public rail transport.

## 1 Scope

This Part 5 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 Technical Specification meet the objective of protecting passengers and staff in railway vehicles in the event of a fire on board by:

- minimizing 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 available until evacuation is complete.

It is not within the scope of this Technical Specification to describe measures which ensure the preservation of the electrical equipment in the event of a fire on board.

## 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 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 60352-1, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance* (IEC 60352-1)

EN 60695-1-1, *Fire hazard testing – Part 1-1: Guidance for assessing the fire hazard of electrotechnical products – General guidelines* (IEC 60695-1-1)

EN 60695-4, *Fire hazard testing – Part 4: Terminology concerning fire tests for electrotechnical products* (IEC 60695-4)

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

EN 61210, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements* (IEC 61210, modified)

EN ISO 13943, *Fire safety – Vocabulary* (ISO 13943)

IEC 60050-811, *International Electrotechnical Vocabulary – Chapter 811: Electric traction*

ISO 3261, *Fire tests – Vocabulary*

ISO 8421-1, *Fire protection – Vocabulary – Part 1: General terms and phenomena of fire*

### 3 Definitions

For the purpose of this Technical Specification, the following definitions apply:

#### 3.1

##### **arc barriers**

device to contain an electrical arc within a prescribed region

#### 3.1.1

##### **arc barriers Type A**

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

#### 3.1.2

##### **arc barriers Type B**

device to contain an electrical arc of potentially long duration, resulting from a failure of high power equipment, within a prescribed region

#### 3.2

##### **arc splash barrier**

device to offer protection against incandescent metal particles arising from making and/or breaking high power electrical contacts

#### 3.3

##### **enclosure**

housing for separating the internal and external environment from the electrical equipment

#### 3.4

##### **electrical equipment**

anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electrical energy

#### 3.5

##### **high power circuits**

all circuits listed below are high power circuits

#### 3.5.1

##### **supply line**

line between the current collector or current source and the main circuit breaker or main fuse(s) on the vehicle

#### 3.5.2

##### **traction circuit**

all circuits from main circuit breaker or main fuse(s) carrying the current of the machines and equipment, such as the converters and traction motors, which transmit the traction output

#### 3.5.3

##### **auxiliary supplies**

#### 3.5.3.1

##### **auxiliary circuit**

circuit carrying the current of the auxiliaries such as the compressors and fans  
[IEV 811-25-05]

#### 3.5.3.2

##### **train power supply**

circuit supplying substantial amounts of power to each vehicle of a train for air-conditioning, heating and other auxiliary services  
[IEV 811-25-06]

#### 3.5.3.3

##### **battery supply circuit**

circuit carrying the current between the battery and the main battery protective device(s), or the unprotected part of the starting circuit

### 3.6

#### **low power circuits**

all circuits except those listed in the definition of high power are low power. For example:

#### 3.6.1

##### **low voltage circuit**

circuit carrying current at a voltage significantly less than voltage of the contact line and supplied by a battery, a converter or a transformer

[IEV 811-25-02]

#### 3.6.2

##### **battery circuits**

circuit carrying the current after the battery protective device(s)

#### 3.6.3

##### **starting circuit**

a specific circuit for starting up an internal combustion engine by its generator as motor or by a separate starter motor, except the unprotected part <sup>1)</sup>

[IEV 811-25-10 (modified)]

#### 3.6.4

##### **control circuit**

circuit used to actuate the power or auxiliary equipment

[IEV 811-25-12]

#### 3.6.5

##### **interlock circuits**

circuit linking mechanical, electrical or other devices, for example through auxiliary contacts, intended to make the operation of a piece of apparatus dependent on the condition or position of one or more others

[IEV 811-25-13]

#### 3.6.6

##### **indicating circuits and monitoring circuits**

circuit transmitting a signal indicating or recording, whether a particular operating condition exists or not; for example a signal indicating a failure in the electrical equipment

[IEV 811-25-14]

#### 3.6.7

##### **protective circuit**

specific circuit, or a part of a control circuit, used for protection

[IEV 811-25-15]

#### 3.6.8

##### **audio-communication circuit**

circuit for sound communication, particularly by microphones and loudspeakers

[IEV 811-25-16]

## 4 Terminology

(Void)

## 5 General requirements

The normal electrical design requirements used for railway vehicles are supplemented by the design requirements of this Technical Specification.

In addition to the design requirements of this Technical Specification, 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).

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<sup>1)</sup> For this part of the Technical Specification, the unprotected part of a starting circuit is considered as high power.



The requirements for fire behaviour properties of materials are specified in CEN/TS 45545-2.

## 6 Design requirements

### 6.1 Overload protection

**6.1.1** When selecting the method and setting of overload protection to be installed between the current collectors and consumers of a 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, i.e. 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).

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

- the normal load;
- line impedance;
- source impedance;
- short circuit characteristics.

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

**6.1.4** 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 could be e.g.:

- operation instruction; <https://standards.iteh.ai/catalog/standards/sist/013df5b9-ac2b-4a00-ba3a-708ec50ceced/sist-ts-clc-ts-45545-5-2009>
- fault detection system design.

### 6.2 Integrity of connection

**6.2.1** Electrical conductors shall be connected reliably by ensuring that:

- a means is provided (screws, connectors, etc.) to maintain the necessary contact pressure corresponding to the current rating and the short circuit strength of the apparatus and the circuit;
- a locking arrangement is provided where the contact pressure would be adversely affected by vibration or thermal cycling;
- current shall not pass through spring washers that are used to maintain the necessary contact pressure;
- precautions are taken to prevent corrosion of the contact areas.

**6.2.2** Any temperature rise that may occur during operation shall not reduce the integrity of cable connections.

**6.2.3** Where soldered connections are used, the cable shall be fixed to exclude mechanical stress at the soldering point.

**6.2.4** Where connections are made using wire wrap techniques, they shall comply with EN 60352-1.

**6.2.5** Where flat, quick-connect terminations are used, they shall comply with EN 61210 and shall be manufactured from tinned phosphor bronze.

### 6.3 Wiring

**6.3.1** The size of cables for a circuit shall be selected so that the cable will not be damaged by carrying excessive current before the protective device operates under fault condition.

**6.3.2** The wiring shall be installed so that the designed operating temperature of the cable is not exceeded.