



**SLOVENSKI STANDARD**  
**SIST EN 50153:1998**  
**01-november-1998**

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**Railway applications - Rolling stock - Protective provisions relating to electrical hazards**

Railway applications - Rolling stock - Protective provisions relating to electrical hazards

Bahnanwendungen - Fahrzeuge - Schutzmaßnahmen in Bezug auf elektrische Gefahren

Applications ferroviaires - Matériel roulant - Mesures de protection vis-à-vis des dangers d'origine électrique

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**ICS:**

13.260	Xæ•ç[ Á!^áÁ \ dā} ā	Protection against electric shock. Live working
45.060.01	Železniška vozila na splošno	Railway rolling stock in general

**SIST EN 50153:1998**

**en**

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EUROPEAN STANDARD  
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Descriptors: Railway equipment, railway rolling stock, safety requirements, accident prevention, protection against electric shocks, protection against live parts

English version

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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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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**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 European Standard was prepared by SC 9XB, Electromechanical material on board of rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50153 on 1995-03-06.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-03-01

For products which have complied with the relevant national standard before 1997-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-03-01.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard, annexes A and B are normative and annex C is informative.

Special national conditions are listed in annex A. A-deviations are listed in annex C.



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## Introduction

It is generally accepted that safety depends on human factors, based on the normal behaviour of the operators involved, as well as upon technical factors.

For the reasons above, in several cases this standard leaves a choice to the contracting parties between two alternatives. These alternatives consist either in the provision of operating rules, regulations and procedures, or in technical measures such as mechanical or electrical *interlocking devices*.

A list of the cases in which the contracting parties (e.g. user and manufacturer) have to come to an agreement before contract is included in annex B.

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## 1 Scope

This standard states a set of rules that are applied in the design and manufacture of electrical installations and equipment to be used on rolling stock so as to protect the persons from *electric shocks*.

The methods used to satisfy the rules may be different, according to the procedures and practices of the operating organisation.

This standard is applicable to vehicles of rail transport systems, road vehicles powered by an external supply (trolley buses), magnetic levitated vehicles and to the electrical equipment installed in these vehicles.

The standard does not apply to:

- mine railways in underground mines;
- crane installations, moving platforms and similar transport systems on rails;
- funicular railways;
- temporary constructions.

Testing of the vehicles against the requirements of this standard is not included. Refer to EN 50215.

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## 2 Normative references

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This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50122-1 (*)	199x	Railway applications - Fixed installations -- Part 1: Protective provisions relating to electrical safety and earthing
EN 50124-1 (*)	199x	Railway applications - Insulation coordination -- Part 1: Basic requirements - Clearances and creepage distances
EN 50126 (*)	199x	Railway applications - The specification and demonstration of dependability - Reliability, availability, maintainability and safety (RAMS)
EN 50163	1995	Railway applications - Supply voltages of traction systems
EN 50215 (*)	199x	Railway applications - Testing of rolling stock on completion of construction and before entry into service
EN 60439	series	Low-voltage switchgear and controlgear assemblies (IEC 439 series, modified)
EN 60529	1991	Degrees of protection provided by enclosures (IP code)
+ corrigendum	1993	(IEC 529:1989)

(\*) in preparation

EN 61310-1	1995	Safety of machinery - Indication, marking and actuation Part 1: Requirements for visual, auditory and tactile signals (IEC 1310-1:1995)
HD 366 S1	1977	Classification of electrical and electronic equipment with regard to protection against electric shock (IEC 536: 1976)
HD 384	series	Electrical installations of building (IEC 364 series, modified)
HD 384.4.41 S2	1996	Part 4: Protection for safety -- Chapter 41: Protection against electric shock (IEC 364-4-41:1992, modified)
IEC 50(191)	1990	International Electrotechnical Vocabulary (IEV) Chapter 191: Dependability and quality of service
IEC 50(441)	1984	Chapter 441: Switchgear, controlgear and fuses
IEC 50(811)	1991	Chapter 811: Electric traction
IEC 50(826)	1982	Electrical installations of buildings (harmonized as HD 384.2)
IEC 479-1	1994	Effects of current on human beings and livestock Part 1: General aspects

### 3 Definitions

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For the purposes of this standard, the following definitions apply. For more information relating to definitions of parts of the fixed installations refer to EN 50122-1 from which these definitions are derived.

NOTE: In order to avoid risks of misunderstanding, definitions used in the text are written in italics.

#### 3.1 Persons involved

##### 3.1.1 skilled person

[CENELEC memorandum No. 2]

A person who can judge the work assigned to him and recognize possible dangers on the basis of his professional training, knowledge and experience and of his knowledge of the relevant requirements.

##### 3.1.2 instructed person

[CENELEC memorandum No. 2]

A person informed about the tasks assigned to him and about possible dangers involved in neglectful behaviour and who, if necessary, has been given a degree of training.

##### 3.1.3 ordinary person

[CENELEC memorandum No. 2]

Any person who can be defined neither as *skilled person* nor as *instructed person*.



## 3.2 Other definitions

### 3.2.1 closed electrical operating area [CENELEC memorandum No. 2]

Any room or location which serves exclusively for the operation of electrical equipment and is kept secured by a means appropriate to the voltage and location. Access to such areas is permitted only to *skilled persons* and *instructed persons*.

### 3.2.2 contact line [IEC 50(811)]

Conductor system for supplying electrical energy to vehicles through current-collecting equipment.

### 3.2.3 contact wire [IEC 50(811)]

The electric conductor of an overhead *contact line* with which the current collectors make contact.

### 3.2.4 direct contact [IEC 50(826)]

Contact of persons or livestock with *live parts*.

### 3.2.5 earth [IEC 50(826)]

The conductive mass of the earth, whose electrical potential at any point is conventionally taken as equal to zero.

### 3.2.6 electrical operating area [CENELEC memorandum No. 2]

Any room or location which serves primarily for the operation of electrical equipment and is normally entered only by *skilled persons* or *instructed persons*.

### 3.2.7 electric shock

A dangerous physiological effect resulting from the passing of an electric current through a human or animal body.

### 3.2.8 exposed conductive part [CENELEC memorandum No. 2]

Any metallic or other form of conductive material which is not energized except in case of *failure*, and which may be accessible to touch.

### 3.2.9 failure [IEC 50(191)]

The termination of the ability of an item to perform a required function.

**3.2.10 hazard** [EN 50126]

A condition that can lead to a potential accident or an accident.

**3.2.11 indirect contact** [IEC 50(826)]

Contact of persons or livestock with *exposed conductive parts* which have become live under fault conditions.

**3.2.12 interlocking device** [IEC 50(441)]

A device which makes the operation of a switching device dependent upon the position or operation of one or more other pieces of equipment.

**3.2.13 live part** [IEC 50(826)]

A conductor or conductive part intended to be energized in normal use, including a neutral conductor.

**iTeh STANDARD PREVIEW****3.2.14 nominal voltage** (standards.iteh.ai) [IEC 50(826), revised]

Voltage by which an installation or part of an installation is designated.

The voltages are expressed for d.c. by the value between poles, ripple-free and for a.c. by the rms value between phases.

NOTE: The actual voltage may differ from the *nominal voltage* by a quantity within permitted tolerances. For further information about traction systems supply voltages see EN 50163.

**3.2.15 obstacle** [IEC 50(826)]

A part preventing unintentional *direct contact*, but not preventing *direct contact* by deliberate action.

**3.2.16 power circuit** [IEC 50(811)]

A circuit carrying the current of the machines and equipment, such as the convertors and traction motors, which transmit the traction output.

**3.2.17 protective bonding**

Equipotential connection for protective purposes.

## 3.2.18 protective conductor

[IEC 50(826), revised]

A conductor used for some protective measures for protection against *electric shock* for electrically connecting any of the following parts:

- *exposed conductive parts*;
- extraneous conductive parts;
- main earthing terminal;
- *earth* electrode;
- earthed point of the source or artificial neutral.

## 4 Classification of voltage bands

## 4.1 General principles

This standard is based on the supply voltages up to which the equipment or electrical circuits are subjected.

The voltages are classified into bands according to the nominal value as shown in table 1. Different installation rules apply to each of these bands.

The power supply of the various circuits installed in railway rolling stock are of different types such as:

- batteries, <https://standards.iteh.ai/catalog/standards/sist/a59a8d74-f2e1-4ccd-b61e-11ee5ccb4d12/sist-en-50153-1998>
- transformers,
- voltage dividers,
- rotating machines,
- static converters,
- capacitors,
- special sources.

Table 1: Voltage bands

Band	<i>Nominal voltage</i>	
	a.c. (V)	d.c. (V)
I	$U \leq 25$	$U \leq 60$
II	$25 < U \leq 50$	$60 < U \leq 120$
III	$50 < U \leq 1000$	$120 < U \leq 1500$
IV	$U > 1000$	$U > 1500$