

# SLOVENSKI STANDARD

## SIST EN 50122-1:2022

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### Nadomešča:

SIST EN 50122-1:2011

SIST EN 50122-1:2011/A1:2011

SIST EN 50122-1:2011/A2:2017

SIST EN 50122-1:2011/A3:2017

SIST EN 50122-1:2011/A4:2017

SIST EN 50122-1:2011/AC:2012

SIST EN 50122-1:2011/AC:2013

IToh STANDARD PREVIEW

**Železniške naprave - Fiksni postroji - Električna varnost, ozemljitev in povratni tokokrog - 1. del: Zaščitni ukrepi proti električnemu udaru**

[SIST EN 50122-1:2022](#)

Railway applications - Fixed installations - Electrical safety, earthing and the return circuit  
- Part 1: Protective provisions against electric shock

Bahnanwendungen - Ortsfeste Anlagen - Elektrische Sicherheit, Erdung und Rückleitung  
- Teil 1: Schutzmaßnahmen gegen elektrischen Schlag

Applications ferroviaires - Installations fixes - Sécurité électrique, mise à la terre et circuit  
de retour - Partie 1: Mesures de protection contre les chocs électriques

**Ta slovenski standard je istoveten z: EN 50122-1:2022**

### **ICS:**

13.260	Varstvo pred električnim udarom. Delo pod napetostjo	Protection against electric shock. Live working
29.280	Električna vlečna oprema	Electric traction equipment

**SIST EN 50122-1:2022**

**en**



EUROPEAN STANDARD

**EN 50122-1**

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EUROPÄISCHE NORM

September 2022

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English Version

## Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock

Applications ferroviaires - Installations fixes - Sécurité électrique, mise à la terre et circuit de retour - Partie 1: Mesures de protection contre les chocs électriques

Bahnanwendungen - Ortsfeste Anlagen - Elektrische Sicherheit, Erdung und Rückleitung - Teil 1: Schutzmaßnahmen gegen elektrischen Schlag

This European Standard was approved by CENELEC on 2022-07-25. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

<https://standards.iteh.ai/catalog/standards/sist/9fa1b357-196c-47d0-a75e-b05cc29efeca/sist-50122-1-2022>  
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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 50122-1:2022) has been prepared by CLC/SC 9XC “Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-07-25
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-07-25

This document supersedes EN 50122-1:2011 and all of its amendments and corrigenda (if any).

EN 50122-1:2022 includes the following significant technical changes with respect to EN 50122-1:2011:

- some definitions were modified;
- the dimensions for protection by clearance were modified, and there are now voltage dependent differences for high voltage electric traction power supply systems;
- methods for the use of protective obstacles were significantly changed.

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

This document has been prepared under a Standardization Request given to CENELEC by the European Commission and the European Free Trade Association.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## EN 50122-1:2022 (E)

## 1 Scope

This document specifies requirements for the protective provisions relating to electrical safety in fixed installations associated with AC and/or DC traction systems and to any installations that can be endangered by the electric traction power supply system. This also includes requirements applicable to vehicles on electrified lines.

It also applies to all aspects of fixed installations which are necessary to ensure electrical safety during maintenance work within electric traction power supply systems.

This document applies to new electric traction power supply systems and major revisions to electric traction power supply systems for:

- a) railways;
- b) guided mass transport systems such as
  - 1) tramways,
  - 2) elevated and underground railways,
  - 3) mountain railways,
  - 4) trolleybus systems,
  - 5) electric traction power supply systems for road vehicles, which use an overhead contact line system, and
  - 6) magnetically levitated systems, which use a contact line system;
- c) material transportation systems.

This document does not apply to: [i/catalog/standards/sist/9fa1b357-196c-47d0-a75e-b05cc29efeca/sist-](https://www.iso.org/standard/61411.html)

- a) electric traction power supply systems in underground mines,
- b) cranes, transportable platforms and similar transportation equipment on rails, temporary structures (e.g. exhibition structures) in so far as these are not supplied directly or via transformers from the contact line system and are not endangered by the electric traction power supply system,
- c) suspended cable cars,
- d) funicular railways,
- e) existing vehicles.

This document does not specify working rules for maintenance.

The requirements within this document related to protection against electric shock are applicable to persons only.

## 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 50119:2020, *Railway applications - Fixed installations - Electric traction overhead contact lines*

EN 50122-2:2022, *Railway applications – Fixed installations – Electrical safety, earthing and the return circuit - Part 2: Provisions against the effects of stray currents caused by d.c. traction systems*

EN 50124-1:2017, *Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment*

EN 50153:2014,<sup>1</sup> *Railway applications - Rolling stock - Protective provisions relating to electrical hazards*

EN 50163:2004,<sup>2</sup> *Railway applications - Supply voltages of traction systems*

EN 50341 (series), *Overhead electrical lines exceeding AC 1 kV*

EN 50522:2010, *Earthing of power installations exceeding 1 kV a.c.*

EN 60529:1991,<sup>3</sup> *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60898-1:2019, *Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation (IEC 60898-1:2016)*

EN 61140:2016, *Protection against electric shock - Common aspects for installation and equipment (IEC 61140:2016)*

EN 61936-1:2010,<sup>4</sup> *Power installations exceeding 1 kV a.c. - Part 1: Common rules (IEC 61936-1:2010)*

<https://standards.iteh.ai/catalog/standards/sist/9fa1b357-196c-47d0-a75e-b05cc29efeca/sist-61936-1-2010>  
EN 62305 (series), *Protection against lightning (IEC 62305 series)*

HD 60364-4-41:2017,<sup>5</sup> *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock (IEC 60364-4-41:2005, modified)*

IEC 60755:2017, *General safety requirements for residual current operated protective devices*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 7010:2019, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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<sup>1</sup> As impacted by EN 50153:2014/A1:2017 and EN 50153:2014/A2:2020.

<sup>2</sup> As impacted by EN 50163:2004/AC:2013 and EN 50163:2004/A2:2020.

<sup>3</sup> As impacted by EN 60529:1991/A1:2000 and EN 60529:1991/A2:2013.

<sup>4</sup> As impacted by EN 61936-1:2010/AC:2011, EN 61936-1:2010:2013 and EN 61936-1:2010/A1:2014.

<sup>5</sup> As impacted by HD 60364-4-41:2017/A11:2017 and HD 60364-4-41:2017/A12:2019.

### 3 Terms and definitions

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

These definitions apply to all standards in this series.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1 Electrical safety and hazards

##### 3.1.1

##### **electrical safety**

freedom from unacceptable risk of harm caused by electrical systems

##### 3.1.2

##### **electric shock**

physiological effect resulting from an electric current passing through a human body or livestock

[SOURCE: IEC 60050-195:2021, 195-01-04]

##### 3.1.3

##### **(effective) touch voltage**

$U_{te}$

voltage between conductive parts when touched simultaneously by a human being

Note 1 to entry: The value of the effective touch voltage can be appreciably influenced by the impedance of the human being in electric contact with these conductive parts.

Note 2 to entry: The conductive path through the body of a human being is conventionally from hand to both feet (horizontal distance of 1 m) or from hand to hand.

[SOURCE: IEC 60050-195:2021, 195-05-11, modified – in the headline “touch voltage, <effective>” was replaced by “(effective) touch voltage”; “or livestock” in the end of the paragraph and in Note 1 have been deleted, the symbol and the Note 2 to entry have been added]

##### 3.1.4

##### **prospective touch voltage**

$U_{tp}$

voltage between simultaneously accessible conductive parts when those conductive parts are not being touched by a human being

[SOURCE: IEC 60050-195:2021, 195-05-09, modified – The symbol has been added, “or livestock” has been deleted.]

##### 3.1.5

##### **body voltage**

$U_b$

product of the current through the body and the body impedance

##### 3.1.6

##### **standing surface**

any point on a surface where persons have an intentional access

**3.1.7****protective boarding**

non-conducting barrier to protect persons from coming into direct contact with a live conductor rail

**3.1.8****electrically protective obstacle**

part preventing unintentional direct contact, but not preventing such contact by deliberate action

Note 1 to entry: Electrically protective obstacles are intentionally applied in this document also for the protection of ordinary persons.

[SOURCE: IEC 60050-195:2021, 195-06-16, modified – in the headline replaced “protective obstacle, <electrically>” by “electrically protective obstacle”, replaced “contact by a human being or livestock with hazardous-live-parts” by “direct contact”, Note 1 to entry has been added]

**3.1.9****anti-trespassing guard**

equipment provided to deter entry to a restricted area, structure or building by an unauthorized person

**3.1.10****conductive part**

part that can carry electric current

[SOURCE: IEC 60050-195:2021, 195-01-06]

**3.1.11****exposed-conductive-part**

conductive part of equipment which can be touched and that is not normally live, but that can become live when basic insulation fails

Note 1 to entry: A conductive part of electrical equipment, which can become live only through contact with an exposed-conductive-part which has become live, is not considered to be an exposed-conductive-part itself.

[SOURCE: IEC 60050-195:2021, 195-06-10, modified - The Note 1 to entry has been added.]

**3.1.12****live part**

conductor or conductive part intended to be energized in normal use

Note 1 to entry: This concept does not necessarily imply a risk of electric shock.

Note 2 to entry: By convention, this does not include the running rails and parts connected to them.

[SOURCE: IEC 60050-811:2017, 811-36-23]

**3.1.13****hazardous-live-part**

live part that, under certain conditions, can give a harmful electric shock

Note 1 to entry: A hazardous voltage can be present on the accessible surface of solid insulation. In such a case, this surface is considered to be a hazardous-live-part .

[SOURCE: IEC 60050-195:2021, 195-06-05]

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**3.1.14****direct contact**

electric contact of human beings or livestock with live parts

[SOURCE: IEC 60050-195:2021, 195-06-03]

**3.1.15****indirect contact**

electric contact of human beings or livestock with exposed-conductive-parts that have become live under fault conditions

[SOURCE: IEC 60050-195:2021, 195-06-04]

**3.1.16****neutral conductor**

conductor electrically connected to the neutral point and capable of contributing to the distribution of electric energy

[SOURCE: IEC 60050-826:2004, 826-14-07]

**3.1.17****protective conductor**

(identification: PE)

**PE**

conductor provided for purposes of safety, for example protection against electric shock

Note 1 to entry: In an electrical installation, the conductor identified PE is normally also considered as protective earthing conductor.

[SOURCE: IEC 60050-826:2004, 826-13-22]

**3.1.18****PEN conductor**

conductor combining the functions of both a protective earthing conductor and a neutral conductor

[SOURCE: IEC 60050-826:2004, 826-13-25]

**3.1.19****solid-wall design**

any kind of construction made of concrete, steel or other material without any holes or gaps

**3.1.20****voltage-limiting device****VLD**

protective device whose function is to prevent existence of an impermissible high touch voltage

[SOURCE: IEC 60050-811:2017, 811-29-41, modified – abbreviation “VLD” added]

**3.2 Earthing and equipotential bonding****3.2.1****earth**

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

**3.2.2****earthing**

connection of conductive parts to an appropriate earth electrode

**3.2.3****earth electrode**

conductive part, which may be embedded in a specific conductive medium, e.g. concrete or coke, in electric contact with earth

[SOURCE: IEC 60050-826:2004, 826-13-05, modified – “in the soil or” has been removed. “the Earth” has been replaced with “earth”.]

**3.2.4****structure earth**

construction made of metallic parts or construction including interconnected metallic structural parts, which can be used as an earth electrode

Note 1 to entry: Examples are reinforced railway structures such as bridges, viaducts, tunnels, mast foundations and reinforced track bed.

**3.2.5****rail to earth resistance**

electrical resistance between the running rails and the earth

**3.2.6****equipotential bonding**

provision of electric connections between conductive parts, intended to achieve equipotentiality

**3.2.7****main equipotential busbar****MEB**

busbar where the equipotential conductors terminate

**3.2.8****earthing conductor**

conductor which provides a conductive path, or part of the conductive path, between a given point in a system or in an installation or in equipment and an earth electrode

**3.2.9****cross bond**

any electrical connection intended to connect two or more conductors of the return circuit in parallel

**3.2.10****rail-to-rail cross bond**

electrical bond that interconnects the running rails of the same track

**3.2.11****track-to-track cross bond**

electrical bond that interconnects tracks

**3.2.12****rail joint bond**

conductor ensuring the electrical continuity of rails at a joint

[SOURCE: IEC 60050-811:2017, 811-35-07]

**3.2.13****open connection**

connection of conductive parts to the return circuit by a voltage-limiting device which makes a conductive connection either temporary or permanent if the limited value of the voltage is exceeded