SLOVENSKI STANDARD

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Železniške naprave - Stabilne naprave električne vleke - Električni zaščitni ukrepi za delo na nadzemnem vodu ali v njegovi bližini in/ali njegovem pripadajočem povratnem tokokrogu

Railway applications - Fixed Installations - Electrical protective measures for working on or near an overhead contact line system and/or its associated return circuit

Bahnanwendungen - Ortsfeste Anlagen - Elektrische Sicherheitsmaßnahmen bei Arbeiten an oder in der Nähe von Oberleitungsanlagen und/oder ihrer Rückleitung

Applications ferroviaires - Installations Fixes - Mesures de sécurité électriques pour le travail sur ou à proximité d'un système de ligne aérienne de contact et/ou de son circuit de retour associé

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English Version

Railway applications - Fixed installations - Electrical protective measures for working on or near an overhead contact line system and/or its associated return circuit

Applications ferroviaires - Installations fixes - Mesures de protection électriques pour des activités de travail sur ou à proximité des systèmes de lignes aériennes de contact et/ou le circuit de retour associé

Bahnanwendungen - Ortsfeste Anlagen - Elektrische Schutzmaßnahmen bei Arbeiten an oder in der Nähe einer Oberleitungsanlage und/oder ihrer zugehörigen Rückleitung

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

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European foreword

This document (EN 50488:2020) has been prepared by CLC/SC 9XC “Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)”, of Technical Committee CLC/TC 9X, “Electrical and electronic applications for railways”.

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)	2021-06-29
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2023-06-29

This document supersedes CLC/TR 50488:2006 and all of its amendments and corrigenda (if any).

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.

Introduction

This document provides railway specific requirements for electrical protective measures for working on or near an overhead contact line system and/or its associated return circuit.

When developing this document, EN 50110-1, *Operation of electrical installations – Part 1: General requirements*, was used as a guide. EN 50110-1 was not developed specifically to apply to the electric traction system which have different characteristics than those commonly found in other electrical installations.

Due to the numerous variations of organization, this document does not give any recommendations concerning organisational structure.

Because of numerous variations in overhead contact lines with nominal voltage lower than 1,5 kV, this document does not deal with work activities on or near these overhead contact lines and/or their associated return circuit.

The trend in Europe is that “dead working” is more common than “live working”. In the countries where live working on the overhead contact lines is allowed, the national regulation should state the necessary safety rules.

1 Scope

This document provides requirements for electrical safety for:

- dead working on an overhead contact line system;
- working activities near an overhead contact line system when it is live.

It applies to all work activities in relation to electrical hazards only.

This document is applicable to overhead contact line systems with the following nominal voltages and configurations:

- 1,5 kV and 3 kV DC;
- 15 kV, 2x15 kV, 25 kV and 2x25 kV AC.

It also provides requirements for work activities that can give rise to electrical hazards from the return circuit.

This document does not cover electrical risk arising from:

- live working on overhead contact line systems (live working can be carried out according to national requirements, regulations and practices);
- working on or near other electrical sources or electrical systems connected to or close to the OCL system and its return circuit.

If there are no other rules or procedures, the principles described in this document can be applied to overhead contact line systems with other nominal voltages.

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 50122-1:2011, *Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

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

3.1.1 General

3.1.1.1
charged
qualifies an entity having non-zero electric charge

[SOURCE: IEC 60050-113:2011, 113-06-26]

3.1.1.2
contact line
conductor system for supplying electric energy to vehicles through current-collecting equipment

Note 1 to entry: This includes all current-collecting conductors and conducting rails or bars, including the following:

- reinforcing feeders;
- cross-track feeders;
- disconnectors;
- section insulators;
- over-voltage protection devices;
- supports that are not insulated from the conductors;
- insulators connected to live parts;
- droppers;
- auxiliary catenary wires;
- stitch wires;
- along-track feeders;

but excluding other conductors, such as earth wires and return conductors.

[SOURCE: IEC 60050-811:2017, 811-33-01, modified – "Along-track feeders" has been added in the note 1 to entry]

3.1.1.3
contact line system
support system and contact line supplying electric energy to vehicles through current-collecting equipment

Note 1 to entry: The contact line system can comprise:

- the contact line,
- masts and foundations,
- supports and any components registering the conductors,
- cross-spans or cables,
- tensioners,
- other along track conductors such as feeders, earth wires and return conductors when supported from the same masts as the contact line,
- conductors connected permanently to the contact line for supplying other electrical equipment such as lighting, signal operation, point control and point heating.

[SOURCE: IEC 60050-811:2017, 811-33-59]

3.1.1.4
dead, adj
DEPRECATED: de-energized, adj
at an electric potential equal to or not significantly different from that of earth at the work location

[SOURCE: IEC 60050-651:2014, 651-21-09, modified – ”worksite” has been replaced with “work location”, Note 1 has been removed]

3.1.1.5
electrical danger
risk of electrical injury when electrical energy is present in an electrical installation

[SOURCE: IEC 60050-651:2014, 651-26-07]

3.1.1.6
electrical hazard
potential source of harm when electric energy is present in an electrical installation

Note 1 to entry: The term “harm” in this context relates to damage to either persons and/or electrical installations.

[SOURCE: IEC 60050-651:2014, 651-26-05, modified – The note 2 to entry and the source ISO-IEC Guide 51:1999 have been removed]

3.1.1.7
electrical injury
any physical damage (including death) to a person caused by electric shock, electric burn, electrical explosion or arcing, or from fire or explosion initiated by electric energy

[SOURCE: IEC 60050-651:2014, 651-26-08, modified – The Note 1 to entry has been removed]

3.1.1.8
electrical installation, <in railway fixed installation>
assembly of electrical equipment forming the overhead contact line system and its associated return circuit used for distribution and/or use of electric energy

3.1.1.9
electrical risk
combination of the probability of the hazard arising and the severity of the harm when electric energy is present in an electrical installation

[SOURCE: IEC 60050-651:2014, 651-26-06, modified – The note 1 to entry and the source ISO/IEC Guide 51:1999 have been removed]

3.1.1.10
hazardous-live-part
live part which, under certain conditions, can give a harmful electric shock

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

[SOURCE: IEC 60050-826:2004, 826-12-13, modified – The Note 1 has been added]

3.1.1.11
live part, <in electric traction>
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]

3.1.1.12
nominal voltage, <of an electrical installation>
value of the voltage by which the electrical installation or part of the electrical installation is designated and identified

[SOURCE: IEC 60050-826:2004, 826-11-01]

3.1.1.13
operation
combination of activities including work activities necessary to permit an electrical installation to function

Note 1 to entry: The operation includes such matters as switching, controlling, monitoring and maintenance.

[SOURCE: IEC 60050-651:2014, 651-26-02 modified – The Note 1 to entry has been modified for the scope of this document; the Note 2 to entry has been removed]

3.1.1.14
overhead contact line
catenary
OCL

contact line placed above or beside the upper limit of the vehicle gauge and supplying vehicles with electric energy through roof-mounted current collection equipment

[SOURCE: IEC 60050-811:2017, 811-33-02, modified – Abbreviated term “OCL” has been added]

3.1.1.15
protective measure
measure intended to achieve adequate risk reduction, implemented:

- by the designer (inherent design, safeguarding and complementary protective measures, information for use) and

- by the user (organization, safe working procedures, supervision, training, permit-to-work systems, provision and use of additional safeguards, use of personal protective equipment)

[SOURCE: IEC 60050-903:2013, 903-01-17]

3.1.1.16
reinforced insulation
insulation of hazardous-live-parts which provides protection against electric shock equivalent to double insulation

Note 1 to entry: Reinforced insulation may comprise several layers which cannot be tested singly as basic insulation or supplementary insulation.

[SOURCE: IEC 61140:2016, 3.10.4]

3.1.1.17
return circuit
all conductors which form the intended path for the traction return current and the current under fault conditions

Note 1 to entry: The conductors can be for example:

- running rails;
- return conductor rails;
- return conductors;
- return cables.

[SOURCE: IEC 60050-811:2017, 811-35-01]

3.1.1.18
(effective) touch voltage
voltage between conductive parts when touched simultaneously by a human or livestock

Note 1 to entry: The value of the effective touch voltage may be appreciably influenced by the impedance of the person or the livestock in electric contact with these conductive parts.

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

[SOURCE: IEC 61140:2016, 3.8.1, modified – The Note 2 has been added]

3.1.2 Personnel, organization and communication

3.1.2.1
designated person in control of an electrical installation
EI
person who has been designated to be the person with direct management responsibility for the operation of an electrical installation

Note 1 to entry: All or parts of this responsibility may be delegated to others as required.

[SOURCE: IEC 60050-651:2014, 651-26-10, modified – The note 2 to entry has been removed]

3.1.2.2
designated person in control of an electrical installation during work activities
EW
person who has been designated to be responsible for the electrical installation and for creating and maintaining an electrically safe work environment at the work location during the work activities

Note 1 to entry: This person has to judge the possible effects of the work activities on the electrical installation or parts of it which are in his or her responsibility and the effects of the electrical installation on persons carrying out the work activities. Some of these duties can be undertaken by different persons (see 4.1, 4.2 and 4.3).

3.1.2.3
designated person in control of a work activity
WA
person who has been designated to be the person with direct management responsibility for the work activity

Note 1 to entry: Parts of this responsibility may be delegated to others as required.

[SOURCE: IEC 60050-651:2014, 651-26-09, modified – The note 2 to entry has been removed]

3.1.2.4
(electrically) instructed person
person adequately advised or supervised by electrically skilled persons to enable him or her to perceive risks and to avoid hazards which electricity can create

[SOURCE: IEC 61140:2016, 3.31]

3.1.2.5
notification
messages or instructions which are either verbal or in writing associated with operation of any electrical installation

[SOURCE: EN 50110-1:2014, 3.2.7]

3.1.2.6
ordinary person
person who is neither a skilled person nor an instructed person

[SOURCE: IEC 60050-826:2004, 826-18-03]

3.1.2.7
(electrically) skilled person
person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create

[SOURCE: IEC 60050-195:1998, 195-04-01]

3.1.3 Zones and distances during work activities

3.1.3.1
danger zone
in the case of high voltage, area limited by the minimum clearance around hazardous-live-parts without complete protection

Note 1 to entry: Entering the danger zone is considered the same as touching hazardous-live-parts.

Note 2 to entry: The outer limit of the danger zone is denoted as the distance D_R (see Annex A).

[SOURCE: EN 61140:2016, 3.35, modified – The Note to entry 2 text is added to clarify the concept's usage within this document]