SLOVENSKI STANDARD
SIST EN 50119:2020

01-julij-2020

Nadomešča:
SIST EN 50119:2009
SIST EN 50119:2009/A1:2013

Železniške naprave - Stabilne naprave električne vleke - Kontaktni vodniki električne vleke

Railway applications - Fixed installations - Electric traction overhead contact lines

Bahnanwendungen - Ortsfeste Anlagen - Oberleitungen für den elektrischen Zugbetrieb

Applications ferroviaires - Installations fixes - Lignes aériennes de contact pour la traction électrique

Ta slovenski standard je istoveten z: **EN 50119:2020**

ICS:

29.280	Električna vlečna oprema	Electric traction equipment

SIST EN 50119:2020 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50119

April 2020

ICS 29.280

Supersedes EN 50119:2009 and all of its amendments and corrigenda (if any)

English Version

Railway applications - Fixed installations - Electric traction overhead contact lines

Applications ferroviaires - Installations fixes - Lignes aériennes de contact pour la traction électrique

Bahnanwendungen - Ortsfeste Anlagen - Oberleitungen für die elektrische Zugförderung

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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

Ref. No. EN 50119:2020 E

Contents

Page

European foreword

This document (EN 50119:2020) has been prepared by CLC/SC 9XC, "Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)" of 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)	2021-01-13
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2023-01-13

This document supersedes EN 50119:2009, as impacted by EN 50119:2009/A1:2013.

EN 50119:2020 includes the following significant technical changes with respect to EN 50119:2009, as impacted by EN 50119:2009/A1:2013:

— requirements for urban mass transportation system are included;

— requirement for rigid overhead contact line (ROCL) are included;

— additional definitions for new terms are included (Clause 3);

— clearances and geometry of overhead contact line are improved (Clause 5);

— urban aspects are added, e.g. wall anchors (Clause 6);

— monitoring devices and automatic earthing and short-circuiting equipment are included (Clause 7);

— overhead contact line for electric trucks is added (Annex C).

Other improvements of this document came from the publication of IEC 60913.

In relation to Subclause 5.1.3, electrical coordination activities are on-going in CLC/SC 9XC (FprEN 50119, the EN 50124 series, prEN 50488 and the EN 50122 series). A Technical Report will be proposed.

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(s).

For the relationship with EU Directive 2016/797/EU, see informative Annex ZZ, which is an integral part of this document.

1 Scope

This document applies to overhead contact line systems in heavy railways, light railways, trolley buses and industrial railways of public and private operators.

This document applies to new installations of overhead contact line systems and for the complete renewal of existing overhead contact line systems.

This document contains the requirements and tests for the design of overhead contact lines, requirements for structures and their structural calculations and verifications as well as the requirements and tests for the design of assemblies and individual parts.

This document does not provide requirements for ground level conductor rail systems (see Figure 1).

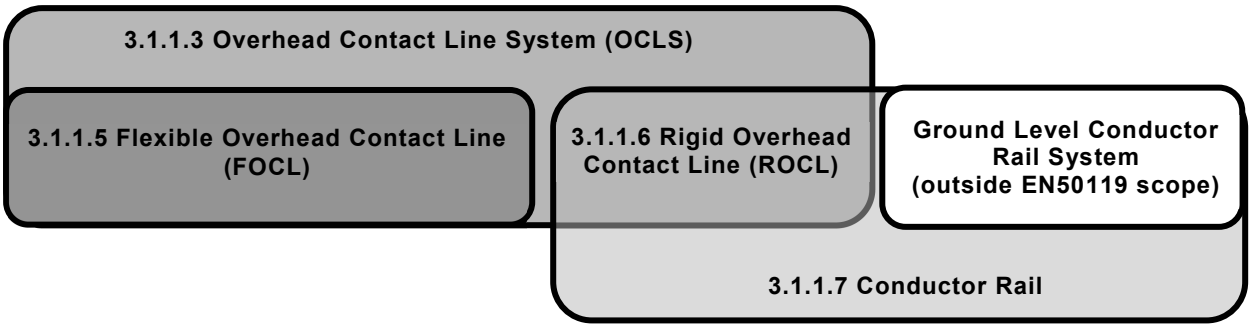

Figure 1 — Scope of contact line systems

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 206, *Concrete - Specification, performance, production and conformity*

EN 485 (all parts), *Aluminium and aluminium alloys – Sheet, strip and plate*

EN 755 (all parts), *Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles*

EN 1536, *Execution of special geotechnical work – Bored piles*

EN 1537, *Execution of special geotechnical works - Ground anchors*

EN 1990:2002, *Eurocode - Basis of structural design*

EN 1090-2:2018, *Execution of steel structures and aluminium structures - Part 2: Technical requirements for steel structures*

EN 1991-1-4:2005, *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions*

EN 1991-2, *Eurocode 1: Actions on structures - Part 2: Traffic loads on bridges*

EN 1992 (all parts), *Eurocode 2: Design of concrete structures*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 1993-1-11:2006, *Eurocode 3 - Design of steel structures - Part 1-11: Design of structures with tension components*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1997 (all parts), *Eurocode 7: Geotechnical design*

EN 1997-1:2004, *Eurocode 7: Geotechnical design - Part 1: General rules*

EN 1997-2:2007, *Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing*

EN 1998 (all parts), *Eurocode 8: Design of structures for earthquake resistance*

EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*

EN 10025 (all parts), *Hot rolled products of structural steels*

EN 10149 (all parts), *Hot rolled flat products made of high yield strength steels for cold forming*

EN 10164, *Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions*

EN 10210 (all parts), *Hot finished structural hollow sections of non-alloy and fine grain steels*

EN 10219 (all parts), *Cold formed welded structural hollow sections of non-alloy and fine grain steels*

EN 12699, *Execution of special geotechnical works - Displacement piles*

EN 12843, *Precast concrete products - Masts and poles*

EN 14229, *Structural timber - Wood poles for overhead lines*

EN 50110-1:2013, *Operation of electrical installations - Part 1: General requirements*

EN 50121-2:2017, *Railway applications - Electromagnetic compatibility - Part 2: Emission of the whole railway system to the outside world*

EN 50122 (all parts), *Railway applications – Fixed installations – Electrical safety, earthing and the return circuit*

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

EN 50122-2:2010, *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 50123 (all parts), *Railway applications – Fixed installations – D.C. switchgear*

EN 50123-4:2003, *Railway applications - Fixed installations - D.C. switchgear - Part 4: Outdoor d.c. disconnectors, switch-disconnectors and earthing switches*

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

EN 50124-2:2017, *Railway applications - Insulation coordination - Part 2: Overvoltages and related protection*

EN 50125-2:2002, *Railway applications - Environmental conditions for equipment - Part 2: Fixed electrical installations*

EN 50149:2012, *Railway applications - Fixed installations - Electric traction - Copper and copper alloy grooved contact wires*

EN 50152 (all parts), *Railway applications –- Fixed installations – Particular requirements for alternating current switchgear*

EN 50152-2:2012, *Railway applications - Fixed installations - Particular requirements for alternating current switchgear - Part 2: Disconnectors, earthing switches and switches with nominal voltage above 1 kV*

EN 50163, *Railway applications - Supply voltages of traction systems*

EN 50182:2001, *Conductors for overhead lines - Round wire concentric lay stranded conductors*

EN 50183:2000, *Conductors for overhead lines - Aluminium-magnesium-silicon alloy wires*

EN 50189:2000, *Conductors for overhead lines - Zinc coated steel wires*

EN 50206-1:2010, *Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 1: Pantographs for main line vehicles*

EN 50206-2:2010, *Railway applications - Rolling stock - Pantographs: Characteristics and tests - Part 2: Pantographs for metros and light rail vehicles*

EN 50317:2012, *Railway applications - Current collection systems - Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line*

EN 50318:2018, *Railway applications - Current collection systems - Validation of simulation of the dynamic interaction between pantograph and overhead contact line*

EN 50326:2002, *Conductors for overhead lines - Characteristics of greases*

EN 50341-1:2012, *Overhead electrical lines exceeding AC 1 kV - Part 1: General requirements - Common specifications*

EN 50345:2009, *Railway applications - Fixed installations - Electric traction - Insulating synthetic rope assemblies for support of overhead contact lines*

EN 50367, *Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead line (to achieve free access)*

EN 50388:2012, *Railway Applications - Power supply and rolling stock - Technical criteria for the coordination between power supply (substation) and rolling stock to achieve interoperability*

CLC/TR 50488:2006, *Railway applications - Safety measures for the personnel working on or near overhead contact lines*

EN 50526 (all parts), *Railway applications – Fixed Installations – D.C. surge arresters and voltage limiting device*

EN 50562, *Railway applications - Fixed installations - Process, protective measures and demonstration of safety for electric traction systems*

EN 50633:2016, *Railway applications - Fixed installations - Protection principles for AC and DC electric traction systems*

EN 60099 (all parts), *Surge arresters (IEC 60099 series)*

EN 60099-4:2014, *Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems*

EN 60168, *Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 kV*

EN 60305:1996, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic or glass insulator units for a.c. systems - Characteristics of insulator units of the cap and pin type*

EN 60383 (all parts), *Insulators for overhead lines with a nominal voltage above 1 kV (IEC 60383, all parts)*

EN 60433:1998, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic insulators for a.c. systems - Characteristics of insulator units of the long rod type*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 60660:1999, *Insulators - Tests on indoor post insulators of organic material for systems with nominal voltages greater than 1 kV up to but not including 300 kV*

EN 60672-1:1995, *Ceramic and glass insulating materials - Part 1: Definitions and classification*

EN 60672-2:2000, *Ceramic and glass insulating materials - Part 2: Methods of test*

EN 60672-3:1997, *Ceramic and glass-insulating materials - Part 3: Specifications for individual materials*

EN 60889:1997, *Hard-drawn aluminium wire for overhead line conductors*

EN 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules (IEC 60947-1)*

EN 61284:1997, *Overhead lines - Requirements and tests for fittings*

EN 61232, *Aluminium-clad steel wires for electrical purposes*

EN 61325:1995, *Insulators for overhead lines with a nominal voltage above 1 kV - Ceramic or glass insulator units for d.c. systems - Definitions, test methods and acceptance criteria*

EN 61773, *Overhead lines - Testing of foundations for structures*

EN 62621:2016, *Railway applications - Fixed installations - Electric traction - Specific requirements for composite insulators used for overhead contact line systems*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1:2013)*

EN ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 2: Nuts with specified property classes - Coarse thread and fine pitch thread (ISO 898-2:2012)*

EN ISO 1461:2009, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:2009)*

IEC 60273:2000, *Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V*

IEC/TS 61245:2015, *Artificial pollution tests on high-voltage ceramic and glass insulators to be used on d.c. systems*

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

3 Terms, definitions, symbols and abbreviations

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

3.1 Terms and definitions

3.1.1
systems

3.1.1.1
contact line system
support system and contact line supplying electric energy to vehicles through current-collecting equipment

Note 1 to entry: The mechanical system can comprise of:

— the contact line;

— structures and foundations;

— supports and any components supporting or registering the conductors;

— head and cross spans;

— along-track feeders, negative feeders, and other lines like earth wires and return conductors, including boosters, as far as they are supported from contact line system structures;

— cross-track feeders;

— disconnectors;

— over-voltage protection devices;

— conductors connected permanently to the contact line for supply of other electrical equipment such as lights, signal operation, point control and point heating;

— any other equipment necessary for operating the contact line.

Note 2 to entry: The electrical limits of which being the feeding point and the contact point to the current collector.

[SOURCE: IEC 60050-811:2017, 811-33-59, modified – Note 1 to entry has been modified and Note 2 to entry has been added.]

3.1.1.2
contact line
conductor system for supplying traction units with electrical energy via current-collection equipment

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

— reinforcing feeders;

— electrical connectors;

— sectioning devices;

— tensioning devices;

— supports that are not insulated from the conductors;

— insulators connected to live parts;

— contact wires;

— catenary wires;

— auxiliary catenary wires;

— stitch wires;

— droppers.

Note 2 to entry: Included are reinforcing feeders and all components that affect the dynamic interaction.

[SOURCE: IEC 60050-811:2017, 811-33-01, modified – “Electric energy to vehicles through” has been replaced with “traction units with electrical energy via”. In the Note 1 to entry “cross-track feeders; disconnectors; section insulators; over-voltage protection devices” have been removed and “electrical connectors, sectioning devices, tensioning devices, contact wires, catenary wires” have been added. The end of the Note 1 to entry has been removed. The Note 2 to entry has been added.]

3.1.1.3
overhead contact line system
contact line system using an overhead contact line to supply current for use by traction units

3.1.1.4
overhead contact line
contact line placed above or beside the upper limit of the vehicle gauge, supplying vehicles with electrical energy through roof-mounted current collection equipment

Note 1 to entry: The overhead contact line may be of a flexible or rigid configuration.

[SOURCE: IEC 60050-811:2017, 811-33-02, modified – “Catenary” has been removed as synonym. In the definition “and” has been removed, “electric” has been replaced with “electrical”. The Note 1 to entry has been added.]

3.1.1.5
flexible overhead contact line
overhead contact line using flexible contact wires

Note 1 to entry: The flexible overhead contact line can be an overhead contact line with catenary suspension (IEC 60050-811:2017, 811–33–05) or a single tramway equipment (IEC 60050-811:2017, 811–33–03).

3.1.1.6
rigid overhead contact line
overhead contact line using rigid profiles

Note 1 to entry: In this document, rigid overhead contact line is used to define conductor rail (3.1.1.7) mounted in an overhead position.

3.1.1.7
conductor rail
rigid metallic conductor mounted on insulators intended to interface with a vehicle mounted current collector

Note 1 to entry: The conductor rail can be of composite construction.

[SOURCE: IEC 60050-811:2017, 811-34-01, modified – The Note 1 to entry has been removed.]

3.1.1.8
inclined catenary
<system> overhead contact line in which one or more contact wires are suspended from the catenary wire by inclined droppers so the catenary wire and contact wire are not in a vertical plane in absence of a wind load

[SOURCE: IEC 60050-811:2017, 811-33-13, modified – The specific use has been added, synonyms “skew catenary “ and “curvilinear catenary” have been removed and “contact wire or wires follow a path corresponding approximately to the centre line of the track” has been replaced with “catenary wire and contact wire are not in a vertical plane in absence of a wind load.]

3.1.1.9
supporting assembly
assembly of components attached to the main support structure that supports and registers the overhead contact line

3.1.1.10
kinematic reference profile
line specific to each gauge, representing the cross-section shape and used as a common basis to work out the sizing rules of the infrastructure and of the rolling stock

Note 1 to entry: See EN 15273-1 and EN 15273-3.

3.1.1.11
static reference profile
kinematic reference profile without the dynamic uplift of the suspension and the vertical oscillations of the vehicles during operation

Note 1 to entry: See EN 15273-1 and EN 15273-3.

3.1.1.12
vertical superelevation

margin added to the reference profile to take into consideration the interconnection of two track gradient by vertical curves of radius

Note 1 to entry: See EN 15273-3.

3.1.1.13
tensioning device
device to maintain the tension of conductors within the system design parameters

[SOURCE: IEC 60050-811:2017, 811-33-45]

3.1.1.14
urban mass transportation system
light rail, tramway and trolleybus system, operating in urban areas, excluding heavy rail systems

3.1.1.15
sectioning device
device used to divide the contact line into different sections or circuits

Note 1 to entry: Sectioning devices includes section insulators and neutral sections.

3.1.1.16
section insulator
sectioning point formed by insulators inserted in a continuous run of a contact line, with skids or similar devices to maintain continuous electrical contact with the current collector

[SOURCE: IEC 60050-811:2017, 811-36-15]