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Railway applications – Fixed installations – Electric traction overhead contact lines systems

INTERNATIONAL
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COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RAILWAY APPLICATIONS – FIXED INSTALLATIONS – ELECTRIC TRACTION OVERHEAD CONTACT LINE SYSTEMS

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This commented version (CMV) of the official standard IEC 60913:2024 edition 3.0 allows the user to identify the changes made to the previous IEC 60913:2013 edition 2.0. Furthermore, comments from IEC TC 9 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 60913 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways. It is an International Standard.

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The European standard EN 50119 has served as a basis for the elaboration of this document.

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c) requirements for rigid overhead contact line (ROCL) are included;
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e) clearances and geometry of overhead contact line are improved (Clause 5);
f) urban aspects are added, for example wall anchors (Clause 6);
g) requirements for monitoring devices, automatic earthing and short-circuiting equipment are included (Clause 7);
h) requirements for overhead contact line for electric vehicles with pantograph on electrified roads are added (Annex E)
i) improvements on the basis of EN 50119:2020 and the questionnaire 9/2619A/Q

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9/3031/FDIS	9/3052/RVD

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The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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RAILWAY APPLICATIONS – FIXED INSTALLATIONS – ELECTRIC TRACTION OVERHEAD CONTACT LINE SYSTEMS

1 Scope

~~This International Standard applies to electric traction overhead contact line systems in heavy railways, light railways, trolley busses and industrial railways of public and private operators.~~

~~It applies to new installations of overhead contact line systems and for the complete reconstruction of existing overhead contact line systems.~~

This document specifies the requirements and tests for the design of overhead contact line systems, 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 standard does not provide requirements for conductor rail systems where the conductor rails are located adjacent to the running rails.~~

This document is applicable to electric traction overhead contact line systems in heavy railways, light railways, for trolley bus lines, electric road systems **1** (Annex E) and industrial railways of public and private operators. This document is applicable to new installations of overhead contact line systems and for the complete renewal of existing overhead contact line systems.

This document does not apply to ground level conductor rail systems (see Figure 1).

NOTE Ground level conductor rail means conductor rails located adjacent to the running rail, e.g. the third rail or a conductor rail in the ground.

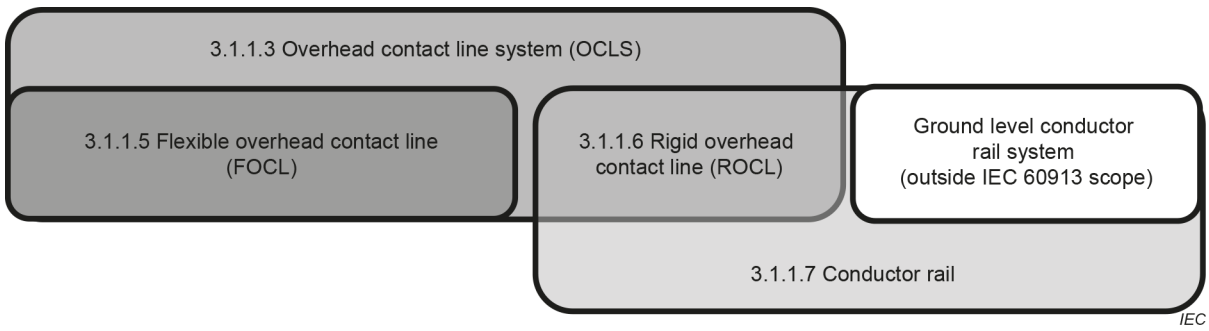

Figure 1 – Scope of contact line systems 2

2 Normative references

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~~NOTE Normative references are made to ISO and IEC standards. For some necessary references, ISO and IEC standards do not exist. In these cases, references are made to European Standards which are normative for Europe according to EN 50119. For non-European countries these references are only informative and listed in the bibliography.~~

~~IEC 60050-811, *International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction*~~

~~IEC 60071 (all parts), *Insulation co-ordination*~~

~~IEC 60099 (all parts), *Surge arresters*~~

~~IEC 60099-1, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*~~

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

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IEC 60273, *Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1 000 V*

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IEC 60433, *Insulators for overhead lines with a nominal voltage above 1 000 V – Ceramic insulators for AC systems – Characteristics of insulator units of the long rod type*

~~*IEC 60494* (all parts), *Railway applications – Rolling stock – Pantographs – Characteristics and tests*~~

IEC 60494-1, *Railway applications – Rolling stock – Pantographs – Characteristics and tests – Part 1: Pantographs for main line vehicles*

IEC 60494-2, *Railway applications – Rolling stock – Pantographs – Characteristics and tests – Part 2: Pantographs for metros and light rail vehicles*

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

IEC 60660, *Insulators – Tests on indoor post insulators of organic material for systems with nominal voltages greater than 1 000 V up to but not including 300 kV*

IEC 60672-1, *Ceramic and glass insulating materials – Part 1: Definitions and classification*

IEC 60672-2, *Ceramic and glass insulating materials – Part 2: Methods of test*

IEC 60672-3, *Ceramic and glass-insulating materials – Part 3: Specifications for individual materials*

IEC 60850, *Railway applications – Supply voltages of traction systems*

~~IEC 60889, *Hard-drawn aluminium wire for overhead line conductors*~~

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

IEC 61089, *Round wire concentric lay overhead electrical stranded conductors*

~~IEC 61109, *Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria*~~

~~IEC 61232, *Aluminium-clad steel wires for electrical purposes*~~

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

IEC 61325, *Insulators for overhead lines with a nominal voltage above 1 000 V – Ceramic or glass insulator units for d.c. systems – Definitions, test methods and acceptance criteria*

IEC 61284:1997, *Overhead lines – Requirements and tests for fittings*

IEC 61773, *Overhead lines – Testing of foundations for structures*

~~IEC 61952, *Insulators for overhead lines – Composite line post insulators for a.c. systems with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria*~~

~~IEC 61992 (all parts), *Railway applications – Fixed installations – DC switchgear*~~

IEC 61992-1, *Railway applications – Fixed installations – DC switchgear – Part 1: General*

IEC 61992-4, *Railway applications – Fixed installations – DC switchgear – Part 4: Outdoor d.c. disconnectors, switch-disconnectors and earthing switches*

~~IEC 61992-5, *Railway applications – Fixed installations – DC switchgear – Part 5: Surge arresters and low-voltage limiters for specific use in d.c. systems*~~

IEC 62128 (all parts), *Railway applications – Fixed installations – Electrical safety, earthing and the return circuit*

~~IEC 62128-1:2003, *Railway applications – Fixed installations – Part 1: Protective provisions relating to electrical safety and earthing*~~

~~IEC 62128-2:2003, *Railway applications – Fixed installations – Part 2: Protective provisions against the effects of stray currents caused by d.c. traction systems*~~

IEC 62236-2~~:2008~~, *Railway applications – Electromagnetic compatibility – Part 2: Emission of the whole railway system to the outside world*

~~IEC 62271-102, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*~~

~~IEC 62271-103:2011, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*~~

IEC 62313, *Railway applications – Power supply and rolling stock – Technical criteria for the coordination between power supply (substation) and rolling stock*

IEC 62486:2017, *Railway applications – Current collection systems – Technical criteria for the interaction between pantograph and overhead contact line (to achieve free access)*

~~IEC 62497 (all parts), *Railway applications – Insulation coordination*~~

IEC 62497-1:2010, *Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment*
IEC 62497-1:2010/AMD1:2013

IEC 62497-2, *Railway applications – Insulation coordination – Part 2: Overvoltages and related protection*

IEC 62498-2:2010, *Railway applications – Environmental conditions for equipment – Part 2: Fixed electrical installations*

~~IEC 62505 (all parts), *Railway applications – Fixed installations – Particular requirements for a.c. switchgear*~~

IEC 62505-2, *Railway applications – Fixed installations – Particular requirements for AC switchgear – Part 2: ~~Single-phase~~ Disconnectors, earthing switches and switches with ~~U_n~~ nominal voltage above 1 kV*

IEC 62621, *Railway applications – Fixed installations – Electric traction – Special requirements for composite insulators used for overhead contact line systems*

IEC 62641: 2022, *Conductors for overhead lines – Aluminium and aluminium alloy wires for concentric lay stranded conductors*

IEC 62724, *Railway applications – Fixed installations – Electric traction – Insulating synthetic rope assemblies for support of overhead contact lines*

IEC 62846:2016, *Railway applications – Current collection systems – Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line*

IEC 62848 (all parts), *Railway applications – DC surge arresters and voltage limiting devices*

IEC 62917, *Railway applications – Fixed installations – Electric traction – Copper and copper alloy grooved contact wires*

IEC 63190, *Railway applications – Fixed installations – Electric traction – Copper and copper alloy catenary wires for overhead contact line systems*

IEC 63248: 2022, *Conductors for overhead lines – Coated or cladded metallic wire for concentric lay stranded conductors*

IEC 63438, *Railway applications – Fixed installations – Protection principles for AC and DC electric traction power supply systems*[1]

IEC 63453, *Railway applications – Current collection systems – Validation of simulation of the dynamic interaction between pantograph and overhead contact line*[2]

ISO 630 (all parts), *Structural steels*

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[1] Under preparation. Stage at the time of publication: IEC/AFDIS 63438:2023.

[2] Under preparation. Stage at the time of publication: IEC/CCDV 63453:2023.

ISO 898-1:2013, *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 898-2:2012, *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 1461:2022, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

ISO 2394, *General principles on reliability for structures*

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

~~ISO 3010:2001, *Basis for design of structures – Seismic actions on structures*~~

ISO 4354, *Wind actions on structures*

ISO 10721 (all parts), *Steel structures*

~~ISO/TR 11069:1995, *Aluminium structures – Material and design – Ultimate limit state under static loading*~~

~~ISO 14688-1, *Geotechnical investigation and testing – Identification and classification of soil – Part 1: Identification and description*~~

~~ISO 14688-2, *Geotechnical investigation and testing – Identification and classification of soil – Part 2: Principles for a classification*~~

~~ISO 14689-1, *Geotechnical investigation and testing – Identification and classification of rock – Part 1: Identification and description*~~

ISO 14713 (all parts), *Zinc coatings – Guidelines and recommendations for the protection against corrosion of iron and steel in structures*

~~ISO/TS 17892 (all parts), *Geotechnical investigation and testing – Laboratory testing of soil*~~

~~ISO 22475-1, *Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1: Technical principles for execution*~~

~~ISO 22476-2, *Geotechnical investigation and testing – Field testing – Part 2: Dynamic probing*~~

~~ISO 22476-3, *Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test*~~

~~ISO 23469:2005, *Bases for design of structures – Seismic actions for designing geotechnical works*~~

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Railway applications – Fixed installations – Electric traction overhead contact lines systems

IEC 60913:2024-04(en)

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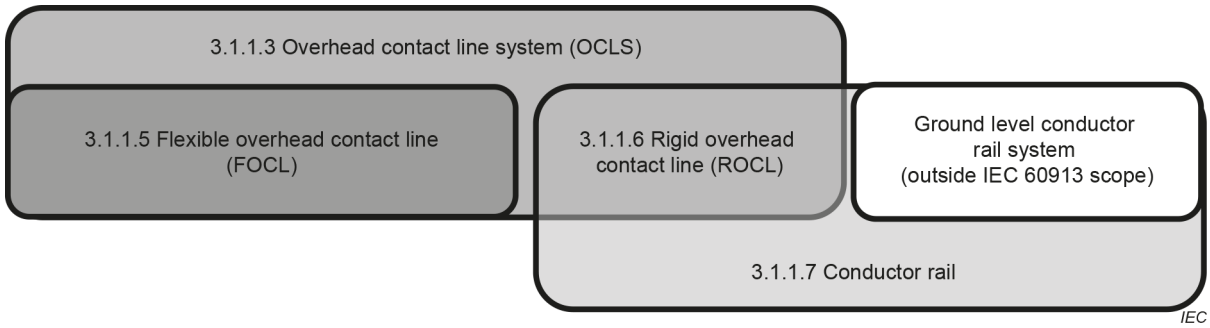

Figure 1 – Scope of contact line systems

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IEC 61089, *Round wire concentric lay overhead electrical stranded conductors*

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

IEC 61325, *Insulators for overhead lines with a nominal voltage above 1 000 V – Ceramic or glass insulator units for d.c. systems – Definitions, test methods and acceptance criteria*

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