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Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead contact lines on electrified roads

Táto norma obsahuje anglickú verziu európskej normy.
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English Version

Railway applications - Current collection systems - Technical criteria for the interaction between pantograph and overhead contact lines on electrified roads

Applications ferroviaires - Systèmes de captage de courant - Critères techniques d'interaction entre le pantographe et la ligne aérienne de contact sur routes electrifiées

Bahnanwendungen - Stromabnahmesysteme - Technische Kriterien für das Zusammenwirken zwischen Dachstromabnehmer und Oberleitungen auf elektrifizierten Straßen

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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 (CLC/TS 50712:2024) has been prepared by CLC/TC 9X “Electrical and electronic applications for railways”.

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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.

Introduction

This document will help to establish a common technical base for overhead contact line type electric road systems (ERS) being built in public field trials in different European states. It enables vehicles and likewise infrastructure providers to develop and produce components and systems for interoperable use.

The main aspects being considered are:

— normative references to vehicle and infrastructure standards;

— definition of the pantograph to contact line system interface;

— requirements for safety concepts and provisions in contact line operation;

— requirements for test, operation, and maintenance of pantographs on commercial vehicles;

— distinction of use cases for externally supplied commercial electric road vehicles (informative).

To reduce carbon dioxide and other emissions caused by road traffic, ERS are being widely discussed and tested in public field trials on different European roads and highways. In this document, the pantograph of an overhead contact line type ERS is described. This ERS uses an overhead contact line system, a power supply and a pantograph to draw electrical energy from a static supply system suspended above a highway to power the propulsion and the battery charging of an electric road vehicle while driving.

As road traffic is highly internationalised and standardized, ERS solutions for commercial vehicles need to be standardized to allow interoperable and international vehicle operation.

This document’s scope is limited to pantograph type current collectors for ERS. The electrical power supply of a commercial road vehicle within ERS is achieved through the collection of current from the overhead contact wires with a suitable pantograph system installed on the vehicle.

As the roadway cannot be used as an electrical return conductor, a 2-pole (positive and negative) contact line system and pantograph are employed. The overhead contact line (OCL) system and the connected vehicles form an electric circuit with the feeder system. This allows for electrical power flow between them. This is considered in terms of electrical safety concepts and protective provisions.

The pantograph and the overhead contact line system (OCLS) are separate mechanically oscillating sub-systems. The design of the sliding contact between them ensures continuous contact and allows for minimum wear of both contact partners conductor and pantograph carbon strips.

1 Scope

This document defines the general characteristics applicable to pantographs for ERS, to enable dynamic current collection of road vehicles from an overhead contact line system. It furthermore defines the electrical and mechanical interface between a pantograph and the infrastructure and between a pantograph and the vehicle.

The document also specifies tests for the pantograph. It includes recommendations for a common safety concept that is related to the electric vehicle and power supply infrastructure and gives recommendations for the maintenance of the pantograph.

This document is applicable to:

— Two-pole pantographs on commercial vehicles during operation on electrified public roads and highways.

This document is not applicable to:

— trolley busses and their electric equipment;

— vehicles in private applications on roads in restricted areas such as truck trolley applications in mines;

— commercial freight vehicles or electric busses with static-only charging systems at e.g. loading/unloading facilities or bus stops.

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

EN 60068-2-64:2008, *Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008)*

EN 61000-4-2, *Electromagnetic compatibility — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test (IEC 61000-4-2)*

ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 6469-3:2021, *Electrically propelled road vehicles — Safety specifications — Part 3: Electrical safety*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2022)*

ISO 10605, *Road vehicles — Test methods for electrical disturbances from electrostatic discharge*

ISO 11452 (all parts), *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy*

ISO 16750-1, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment; Part 1: General*

ISO 16750-2, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment; Part 2: Electrical loads*

ISO 16750-3, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment; Part 3: Mechanical loads*

ISO 16750-4, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment; Part 4: Climatic loads*

ISO 16750-5, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 5: Chemical loads*

ISO 26262-5:2018, *Road vehicles — Functional safety — Part 5: Product development at the hardware level*