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Railway applications - Rolling stock - Electric equipment in trolley buses - Safety requirements and current collection systems

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 02/16

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EUROPEAN STANDARD

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**EN 50502**

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Supersedes CLC/TS 50502:2008

English Version

# Railway applications - Rolling stock - Electric equipment in trolley buses - Safety requirements and current collection systems

Applications ferroviaires - Matériel roulant - Equipement électrique des trolleybus - Exigences de sécurité et systèmes de connexion

Bahnanwendungen - Fahrzeuge - Elektrische Ausrüstung in O-Bussen - Sicherheitsanforderungen und Verbindungssysteme

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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 50502:2015) has been prepared by CLC/SC 9XB "Electromechanical material on board rolling stock" of the Technical Committee CENELEC 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) 2016-03-30
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-03-30

This document supersedes CLC/TS 50502:2008.

EN 50502:2015 includes the following significant technical changes with respect to CLC/TS 50502:2008:

- Clause 1: a more detailed scope (guided vehicles) in reference to other electric vehicles;
- 5.6.1: insulation resistance and separate source applied voltage tests for voltage band I components is waived with respect to other electric vehicles and with reference to ECE R100;
- Table 5: test voltages for components intended to break a current which are used with open contacts for supplementary or basic insulation;
- 6.4.2: specification of periodical checks additional to insulation resistance tests;
- 6.2.5, Table 6: electrical tests of the insulation of entrance areas are waived, visual inspection is added;
- 6.5: extension of description and test of different leakage detectors;
- A.3: description of special requirements for external insulations;
- A.13, A.14: addition of energy storage systems and fuel cells;
- B.2.4.6: equipment for switch operation of overhead contact line.

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

# 1 Scope

This European Standard applies to electrical systems on board of vehicles of the type trolley bus, as defined in 3.1, fed with a nominal line voltage ($U_n$) between 600 V d.c. and 750 V d.c.

This European Standard defines the requirements and constructional hints, especially to avoid electrical danger to the public and to staff. Where special requirements are existing for trolley buses, hints are given for mechanical and functional safety as well as for protection against fire.

This European Standard covers vehicles intended for public transport of persons. This Standard applies to:

- trolley buses,
- buses with current rail for guidance in the road surface,
- guided buses with bipolar roof current collector.

This European Standard does not apply to:

a) electric driven vehicles with only internal power supply:
   1) hybrid vehicles,
   2) diesel - electric vehicles,
   3) fuel - cell vehicles,
   4) battery vehicles,
b) vehicles with safe protective bonding:
   1) rubber tyred commuter trains,
   2) guided buses with supply by a separate current rail,
   3) rail guided buses with unipolar roof current collector,
c) vehicles operated outside publicly accessible areas:
   1) electric driven lorries on motorways.

Guidance and current rails are special solutions and at this time are not under standardization like trolley bus current collectors and overhead contact lines (OCL).

It refers mainly to earthed networks, but reference is made also to galvanically insulated networks.

Annex A is related to detailed design features for trolley buses.

Annexes B and C are related to the current collection systems. The detailed scope of these annexes is given in Annex B.

# 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 45502 (all parts), *Active implantable medical devices*

EN 45545-5, *Railway applications — Fire protection on railway vehicles — Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles*

EN 50110 (all parts), *Operation of electrical installations*

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

EN 50119, *Railway applications — Fixed installations — Electric traction overhead contact lines*

EN 50121 (all parts), *Railway applications — Electromagnetic compatibility*

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

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

EN 50125-1, *Railway applications — Environmental conditions for equipment — Part 1: Rolling stock and on-board equipment*

EN 50153, *Railway applications — Rolling stock – Protective provisions relating to electrical hazards*

EN 50155, *Railway applications — Electronic equipment used on rolling stock*

EN 50163, *Railway applications — Supply voltages of traction systems (IEC 60850)*

EN 50178, *Electronic equipment for use in power installations*

EN 50215:2009, *Railway applications — Rolling stock — Testing of rolling stock on completion of construction and before entry into service*

EN 50264 (all parts), *Railway applications — Railway rolling stock power and control cables having special fire performance*

EN 50272-3, *Safety requirements for secondary batteries and battery installations — Part 3: Traction batteries*

EN 50306 (all parts), *Railway applications — Railway rolling stock cables having special fire performance — Thin wall*

EN 50343, *Railway applications — Rolling stock — Rules for installation of cabling*

CLC/TS 50457 (all parts), *Conductive charging for electric vehicles*

EN 50500, *Measurement procedures of magnetic field levels generated by electronic and electrical apparatus in the railway environment with respect to human exposure*

EN 60034 (all parts), *Rotating electrical machines (IEC 60034, all parts)*

EN 60077 (all parts), *Railway applications — Electrical equipment for rolling stock (IEC 60077, all parts)*

EN 60146 (all parts), *Semiconductor converters (IEC 60146, all parts)*

EN 60322, *Railway applications — Electrical equipment for rolling stock — Rules for power resistors of open construction (IEC 60322)*

EN 60349 (all parts), *Electric traction — Rotating electrical machines for rail and road vehicles (IEC 60349, all parts)*

EN 60445, *Basic and safety principles for man-machine interface, marking and identification — Identification of equipment terminals, conductor terminations and conductors (IEC 60445)*

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

EN 60721-3-5, *Classfication of environmental conditions — Part 3: Classification of groups of environmental parameters and their severities — Section 5: Ground vehicle installations (IEC 60721-3-5)*

EN 61111, *Live working — Electrical insulating matting (IEC 61111)*

EN 61287-1, *Railway applications — Power converters installed on board rolling stock — Part 1: Characteristics and test methods (IEC 61287-1)*

EN 61373, *Railway applications — Rolling stock equipment — Shock and vibration tests (IEC 61373)*

EN 61557-2, *Electrical safety in low voltage distribution systems up to 1 000V a.c. and 1 500 V d.c. — Equipment for testing, measuring or monitoring of protective measures — Part 2: Insulation resistance (IEC 61557-2)*

EN 61557-8, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. — Equipment for testing, measuring or monitoring of protective measures — Part 8: Insulation monitoring devices for IT systems (IEC 61557-8)*

EN 61851 (all parts), *Electric vehicle conductive charging system (IEC 61851, all parts)*

EN 61881 (all parts), *Railway applications — Rolling stock equipment — Capacitors for power electronics (IEC 61881, all parts)*

EN 62196-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets — Conductive charging of electric vehicles — Part 1: General requirements (IEC 62196-1)*

IEC 60479 (all parts), *Effects of current on human beings and livestock*

ISO 6469-3, *Electrically propelled road vehicles — Safety specifications — Part 3: Protection of persons against electric shock*

ISO 10099, *Pneumatic fluid power — Cylinders — Final examination and acceptance criteria*

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

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

ISO 23273, *Fuel cell road vehicles — Safety specifications — Protection against hydrogen hazards for vehicles fuelled with compressed hydrogen*