

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

BS EN 50502:2015



BSI Standards Publication

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

bsi.

...making excellence a habit.™

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

This British Standard is the UK implementation of EN 50502:2015. It supersedes DD CLC/TS 50502:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/9/2, Railway Electrotechnical Applications - Rolling st.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2015. Published by BSI Standards Limited 2015

ISBN 978 0 580 76624 4

ICS 45.060.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2015.

Amendments issued since publication

Date	Text affected
------	---------------

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

August 2015

ICS 45.060.01

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

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

This European Standard was approved by CENELEC on 2015-03-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

Contents

European foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	7
4 Voltages and classification of the voltage bands	10
4.1 Voltages	10
4.2 Classification of the voltage bands	11
5 Trolley bus construction	12
5.1 Protection and electrical safety criteria	12
5.2 Electrical components in band III voltage (high voltage)	16
5.3 Electric traction equipment.....	17
5.4 Power supply independent from OCL.....	18
5.5 Electrical components in band II voltage (medium voltage)	19
5.6 Electrical components in band I voltage (low voltage).....	19
6 Checks and tests.....	20
6.1 General information.....	20
6.2 New trolley-vehicles	21
6.3 Overhauled trolley-vehicles.....	28
6.4 On-duty trolley vehicles (periodical checks)	28
6.5 Leakage Detectors (overhaul, definitions, thresholds).....	29
Annex A (normative) Constructional detailed provisions.....	39
A.1 General information.....	39
A.2 Attachment of the current collection system and other components	39
A.3 Insulations	39
A.4 Ventilation	39
A.5 Accessibility.....	40
A.6 Location of the main circuit breaker.....	40
A.7 Inlet and outlet points of cables	40
A.8 Cabling.....	40
A.9 Test terminal board	40
A.10 Insulation leakage pre-alarm.....	40
A.11 Equipment connected to different voltage band circuits	40
A.12 Segregation of band III circuits	40
A.13 Batteries and other energy storage devices	41
A.14 Fuel cells	41
A.15 Environmental conditions.....	41
Annex B (normative) Trolley buses – Current collection system for overhead contact lines	42
B.1 Scope	42
B.2 General Characteristics	42
B.3 Marking	52
B.4 Checks and tests.....	52
B.5 Inspections	56
B.6 Electromagnetic compatibility	56
Annex C (normative) Constructional requirements for current collection systems	57

This is a preview of "BS EN 50502:2015". Click here to purchase the full version from the ANSI store.

C.1	General information.....	57
C.2	Material of the trolley poles	57
C.3	Current connections	57
C.4	Joints.....	57
C.5	Cable insulation.....	57
C.6	Abnormal line height	57
	Bibliography.....	59

Figures

Figure 1	— Insulation overview — Trolley buses.....	13
Figure 2	— Test circuits.....	23
Figure 3	— Megaohmmeter connection	26
Figure 4	— Megaohmmeter connection	27
Figure 5	— Leakage current monitoring.....	31
Figure 6	— Insulation resistance monitoring.....	32
Figure 7	— Touch voltage monitoring with sliding wires	33
Figure 8	— Touch voltage monitoring with grounded overhead contact line	33
Figure 9	— Compensation of the voltage drop on the grounded overhead contact line.....	34
Figure 10	— Voltage development with a load connected to the overhead contact line	34
Figure 11	— Function check of the leakage current monitoring.....	36
Figure 12	— Function check of the insulation resistance monitor.....	37
Figure 13	— Function check of the touch voltage monitor with test against the positive of overhead line or external voltage source	38
Figure 14	— Function check of the touch voltage monitor with test against the positive of overhead line or external voltage source	38
Figure B.1	— General characteristics of a typical current collector	42
Figure B.2	— Preferred excursion of trolley poles versus distances of contact lines to ground	43
Figure B.3	— Example of fit of pole and the head	45
Figure B.4	— Example of fit of mounting frame with the support base.....	45
Figure B.5	— Typical trolley.....	46
Figure B.6	— Typical slipper	47
Figure B.7	— Devices (if any) for recovering and excursion limiting of pole ropes position, overall dimensions and signalling	50
Figure B.8	— Scheme of the verification of the detachment the current collector head.....	56

Tables

Table 1	— Voltage bands for trolley buses	11
Table 2	— Voltage bands for France	11
Table 3	— Voltage bands for Italy (Decree D.P.R. 547: 1955, Law 191:1974)	11
Table 4	— Voltage bands for electric plants on road vehicles	12
Table 5	— Test voltages U_a based on rated insulation voltage U_{Nm}	24
Table 6	— Summary of electric tests	29
Table B.1	— Summary of tests and checks	53

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

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.

This is a preview of "BS EN 50502:2015". [Click here to purchase the full version from the ANSI store.](#)

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*