



# SLOVENSKI STANDARD

## SIST EN 50467:2012

01-februar-2012

Nadomešča:

SIST-TS CLC/TS 50467:2008

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### Železniške naprave - Železniška vozila - Konektorji, zahteve in preskusne metode

Railway applications - Rolling stock - Electrical connectors, requirements and test methods

Bahnanwendungen - Fahrzeuge - Elektrische Steckverbinder, Bestimmungen und Prüfverfahren

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**Ta slovenski standard je istoveten z: EN 50467:2011**

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EUROPEAN STANDARD  
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English version

**Railway applications -  
Rolling stock -  
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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## Foreword

This document (EN 50467:2011) has been prepared by SC 9XB, "Electromechanical material on board rolling stock", of 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) 2012-10-10
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2014-10-10

This document supersedes CLC/TS 50467:2008.

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## Introduction

This European Standard provides performance requirements and tests for low-voltage electrical connectors deemed to be installed on board railway rolling stock, either indoors or outdoors. Safety requirements and tests for electrical connectors are already covered in general by EN 61984:2001. The additional requirements and testing of specific characteristics demanded by rolling stock applications are set out in this European Standard. One goal of this European Standard is to avoid retesting of electrical connectors already in compliance with EN 61984:2001 for those characteristics that have been assessed suitable also for use on board rolling stock.

Among the additional requirements for use on board rolling stock, those that can be verified by documentation of tests on the raw materials are distinguished from those to be assessed by tests on the component.

Due to the wide spectrum of existing and future specific rolling stock applications of electrical connectors, this European Standard does not select any particular geometric configuration of connectors, nor establish any particular values for electrical ratings such as voltage and current, or for any other characteristic. All such details should be selected and agreed between the parties involved (e.g. manufacturer and user) depending on the electrical, mechanical and environmental conditions expected in the intended use. Annexes A and C of this European Standard provide guidance.

Upon agreement between the parties involved, this European Standard may be used in conjunction with existing connector detail specifications for interchangeability purposes.

Other standards may be developed in future under the umbrella format of this European Standard, for particular connector designs for applications on board rolling stock, to fix dimensions for interchangeability and to set the additional requirements for specific applications that, due to complexity and variety, are left here to agreement between parties involved. [SIST EN 50467:2012](https://standards.iteh.ai/catalog/standards/sist/2f53c28a-4cc9-44b7-be6c-2899c56478c6/sist-en-50467-2012)

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This European Standard does not cover:

- *connectors with breaking capacity (CBCs)* as defined in EN 61984:2001, 3.2, because on board rolling stock connectors are not deemed to be operated (i.e. connected or disconnected) under load or when live, either by means of procedures or by the presence of interlocks, as required by EN 50153,

NOTE For the purpose of this European Standard connectors on board rolling stock are therefore considered as being always without breaking capacity, therefore where needed for safety reasons, adequate procedures or interlocks (i.e. locking devices that cannot be opened without the aid of a special tool) shall be provided in the end application.

- *non-rewirable connectors* as defined in EN 61984:2001, 3.5,
- *automatic couplers*, due to their additional mechanical complexity and the need for more specific requirements and testing,
- *inter-vehicle jumpers*, as they are connector and cable assemblies whose characteristics depend on those of both elements. Inter-vehicle connectors within the limits set in the scope of this European Standard are therefore covered by the agreed choice of suitable mechanical and environmental characteristics as defined by Annex B, and suggested by Annex C.

## 1 Scope

This European Standard retains EN 61984:2001 as the minimum performance requirements for railway rolling stock electrical connectors.

It identifies additional terms, test methods and performance requirements for single-pole and multipole connectors with rated voltages up to 1 000 V, rated currents up to 125 A per contact and frequencies below 3 MHz used for indoor and outdoor applications in railway rolling stock.

This European Standard identifies the application levels for electrical connectors based on

- the severity of the service conditions in different rolling stock technologies,
- the intended use of the rolling stock,
- the location of the connector in the rolling stock system.

This European Standard is not applicable to internal connections of electronic devices such as connectors for printed boards and rack-and-panel connectors.

## 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 50124-1:2001 + A2:2005	Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
EN 50153:2002	Railway applications - Rolling stock - Protective provisions relating to electrical hazards
EN 50264-1:2008	Railway rolling stock power and control cables having special fire performance - Part 1: General requirements
EN 50264-2-1	Railway applications - Railway rolling stock power and control cables having special fire performance - Part 2-1: Cables with crosslinked elastomeric insulation - Single core cables
EN 50264-2-2	Railway applications - Railway rolling stock power and control cables having special fire performance - Part 2-2: Cables with crosslinked elastomeric insulation - Multicore cables
EN 50264-3-1	Railway applications - Railway rolling stock power and control cables having special fire performance - Part 3-1: Cables with crosslinked elastomeric insulation with reduced dimensions - Single core cables
EN 50264-3-2	Railway applications - Railway rolling stock power and control cables having special fire performance - Part 3-2: Cables with crosslinked elastomeric insulation with reduced dimensions - Multicore cables
EN 50306-1:2002	Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 1: General requirements
EN 50306-2:2002	Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 2: Single core cables
EN 50306-3:2002	Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 3: Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed
EN 50306-4:2002	Railway applications - Railway rolling stock cables having special fire performance - Thin wall - Part 4: Multicore and multipair cables standard wall sheathed



EN 50382-1:2008	Railway applications - Railway rolling stock high temperature power cables having special fire performance - Part 1: General requirements
EN 50382-2:2008	Railway applications - Railway rolling stock high temperature power cables having special fire performance - Part 2: Single core silicone rubber insulated cables for 120 °C or 150 °C
EN 60068-1	Environmental testing - Part 1: General and guidance (IEC 60068-1:1988 + corrigendum Oct. 1988 + A1:1992)
EN 60068-2-70:1996	Environmental testing - Part 2: Tests - Test Xb: Abrasion of markings and letterings caused by rubbing of fingers and hands (IEC 60068-2-70:1995)
EN 60309-1:1999	Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements (IEC 60309-1:1999)
EN 60352-2:2006	Solderless connections - Part 2: Crimped connections - General requirements, test methods and practical guidance (IEC 60352-2:2006)
EN 60352-3	Solderless connections - Part 3: Solderless accessible insulation displacement connections - General requirements, test methods and practical guidance (IEC 60352-3:1993)
EN 60352-4:1994 + A1:2000	Solderless connections - Part 4: Solderless non-accessible insulation displacement connections - General requirements, test methods and practical guidance (IEC 60352-4:1994 + A1:2000)
EN 60352-5:2008	Solderless connections - Part 5: Press-in connections - General requirements, test methods and practical guidance (IEC 60352-5:2008)
EN 60352-6	Solderless connections - Part 6: Insulation piercing connections - General requirements, test methods and practical guidance (IEC 60352-6:1997)
EN 60352-7	Solderless connections - Part 7: Spring clamp connections - General requirements, test methods and practical guidance (IEC 60352-7:2002)
EN 60512-1	Connectors for electronic equipment - Tests and measurements - Part 1: General (IEC 60512-1:2001)
EN 60512-1-1:2002	Connectors for electronic equipment - Tests and measurements - Part 1-1: General examination - Test 1a: Visual examination (IEC 60512-1-1:2002)
EN 60512-4-1:2003	Connectors for electronic equipment - Tests and measurements - Part 4-1: Voltage stress tests - Test 4a: Voltage proof (IEC 60512-4-1:2003)
EN 60512-5-1:2002	Connectors for electronic equipment - Tests and measurements - Part 5-1: Current-carrying capacity tests - Test 5a: Temperature rise (IEC 60512-5-1:2002)
EN 60512-11-6:2002	Connectors for electronic equipment - Tests and measurements - Part 11-6: Climatic tests - Test 11f: Corrosion, salt mist (IEC 60512-11-6:2002)
EN 60512-11-7:2003	Connectors for electronic equipment - Tests and measurements - Part 11-7: Climatic tests - Test 11g: Flowing mixed gas corrosion test (IEC 60512-11-7:2003)
EN 60512-19-3:1997	Electromechanical components for electronic equipment - Basic testing procedures and measuring methods - Part 19: Chemical resistance tests - Section 3: Test 19c - Fluid resistance (IEC 60512-19-3:1997)
EN 60512-23-3:2001	Electromechanical components for electronic equipment - Basic testing procedures and measuring methods - Part 23-3: Test 23c: Shielding effectiveness of connectors and accessories (IEC 60512-23-3:2000)
EN 60512-23-4:2001	Connectors for electronic equipment - Tests and measurements - Part 23-4: Screening and filtering tests - Test 23d: Transmission line reflections in the time domain (IEC 60512-23-4:2001)
EN 60529:1991 + A1:2000	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989 + A1:1999)

EN 60664-1:2007	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests (IEC 60664-1:2007)
EN 60999-1:2000	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units - Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm <sup>2</sup> up to 35 mm <sup>2</sup> (included) (IEC 60999-1:1999)
EN 60999-2:2003	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units - Part 2: Particular requirements for clamping units for conductors above 35 mm <sup>2</sup> up to 300 mm <sup>2</sup> (included) (IEC 60999-2:2003)
EN 61210	Connecting devices - Flat quick-connect terminations for electrical copper conductors - Safety requirements (IEC 61210:1993, mod.)
EN 61373:1999	Railway applications - Rolling stock equipment - Shock and vibration tests (IEC 61373:1999)
EN 61984:2001 <sup>1)</sup>	Connectors - Safety requirements and tests (IEC 61984:2001)
EN ISO 4892-2:2006	Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2006)
HD 588.1 S1:1991	High-voltage test techniques - Part 1: General definitions and test requirements (IEC 60060-1:1989 + corrigendum Mar. 1990 + corrigendum Mar. 1992)
IEC 60050-581:2008	International Electrotechnical Vocabulary - Part 581: Electromechanical components for electronic equipment
IEC 60417-DB	Graphical symbols for use on equipment
IEC 60760	Flat, quick-connect terminations
ISO 1431-1:2004	Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Part 1: Static and dynamic strain testing

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581:2008 and the following apply.

#### 3.1

##### connection

two mated connectors or contacts

EXAMPLES See Figure 1.

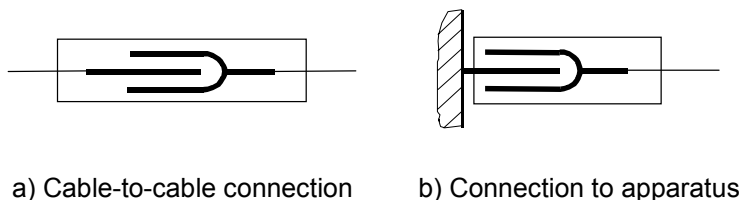


Figure 1 — Typical examples of connections

<sup>1)</sup> Will be superseded by EN 61984:2009, *Connectors - Safety requirements and tests* (IEC 61984:2008) at the end of the latter, i.e. 2012-06-01.

**3.2****connector**

component which terminates conductors for the purpose of providing connection to and disconnection from a suitable mating component

[IEV 581-26-01]

NOTE Connectors covered by this standard are not intended to be connected and disconnected under electrical load ]

**3.3****free connector**

connector for attachment to the free end of a wire or cable

[IEV 581-26-10]

**3.4****fixed connector**

connector for attachment to a rigid surface

[IEV 581-06-10]

**3.5****enclosed connector**

connector where protection against electric shock is provided by its enclosures

**3.6****unenclosed connector**

connector where protection against electric shock is provided by the enclosure of the equipment, in which the connector is mounted.

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NOTE The protection against electrical shock is provided by e.g the enclosure of the equipment in which the unenclosed connector is mounted. In accordance with the applicable product standard [EN 50467:2012](https://standards.iteh.ai/catalog/standards/sist/2f53c28a-4cc9-44b7-be6c-3899c56478c6/sist-en-50467-2012)

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**3.7****inter-vehicle connector**

connector deemed to be assembled with proper cable to form a cable assembly for inter-vehicle electrical connection

**3.8****contact**

conductive element in a connector (including means for cable termination) that mates with a corresponding element to provide an electrical path

**3.9****male contact**

contact (including means for cable termination) designed for electrical engagement on its outer surface and to enter a female contact, thus forming an electrical connection

EXAMPLES Tab, pin, blade.

**3.10****female contact**

contact (including means for cable termination) designed for electrical engagement on its inner surface, and to accept entry of a male contact, thus forming an electrical connection

EXAMPLES Receptacle, sleeve.

**3.11****cable termination**

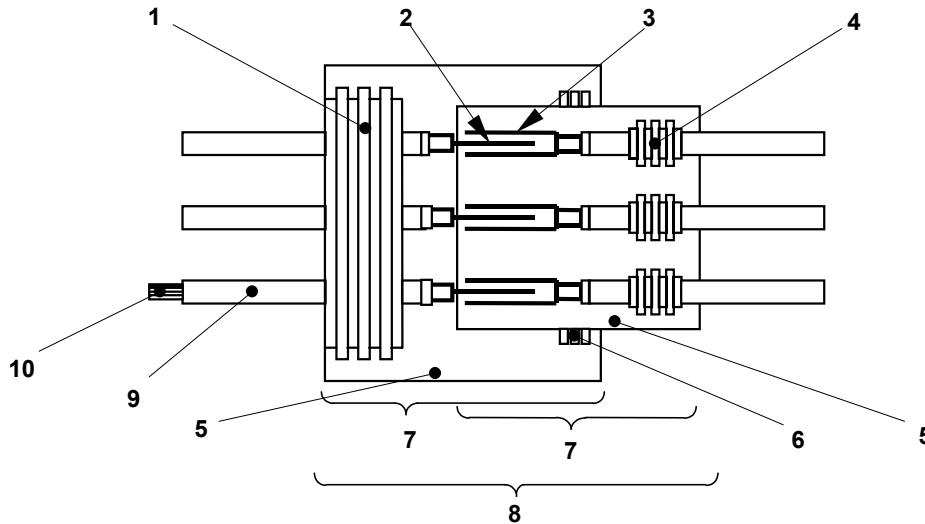
any joining of cable to contact

EXAMPLES Crimp, insulation displacement, screwing, spring clamp.

### 3.12 multipole connector

connector with more than one contact

EXAMPLE See Figure 2.



#### Key

1 Multiple cable seal	6 Housing seal
2 Male contact	7 Multipole connector
3 Female contact	8 Multipole connection
4 Single cable seal	9 Cable
5 Housing	10 Conductor

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**Figure 2 — Multipole connectors**

### 3.13 connector coding

device, either visual, or mechanical or sensitive, or a combinations of these, preventing connection of connectors from the same family and having the same number of contacts but with different coding

### 3.14 intended use

application conditions of connectors which are included within the permissible rated values and environmental conditions and characteristic assigned by the manufacturer's specification

### 3.15 interlock

device, either electrical or mechanical, which prevents the contacts of a connector from becoming live before it is in proper engagement with its counterpart, and which either prevents the connector from being withdrawn while its contacts are live or makes the contacts dead before separation

[EN 60309-1:1999, 2.9, mod.]

### 3.16 cycle of mechanical operation (mating cycles)

one insertion and one withdrawal of the connector halves

[EN 61984:2001, 3.9]

**3.17****clamping unit**

part(s) of the terminal necessary for the mechanical clamping and the electrical connection of the conductor(s), including the parts which are necessary to ensure the correct contact pressure

[EN 60999-1:2000, 2.1]

**3.18****upper limiting temperature**

maximum permissible temperature of a connector assigned by the manufacturer at which the connector may still operate. It takes into consideration the temperature rise due to heating of the contacts by current flow plus the ambient temperature

**3.19****lower limiting temperature**

minimum permissible temperature of a connector assigned by the manufacturer at which the connector may still operate

**3.20****clearance**

shortest distance in air between two conductive parts

[EN 60664-1:2007, 1.3.2]

**3.21****creepage distance**

shortest distance along the surface of the insulating material between two conductive parts

[EN 60664-1:2007, 1.3.3]

**3.22**

**over voltage category** <https://standards.iteh.ai/catalog/standards/sist/2f53c28a-4cc9-44b7-be6c-3808-7d1f78c6/sist-en-50467-2012>  
numeral defining a transient over voltage condition

[EN 60664-1:2007, 1.3.10]

**3.23****pollution**

any addition of foreign matter, solid, liquid, or gaseous (ionised gases), that can result in a reduction of electrical strength or specific surface resistivity of the insulation

[EN 60664-1:2007, 1.3.11]

**3.24****pollution degree**

numeral characterising the expected pollution of the micro-environment

[EN 60664-1:2007, 1.3.13]

**3.25****rated voltage**

value of voltage assigned by the manufacturer to the connector and to which operation and performance characteristics are referred

NOTE A connector may have more than one rated voltage value.

[EN 60664-1:2007, 1.3.9, mod.]

**3.26****rated insulation voltage**

r.m.s. withstand voltage value assigned by the manufacturer to the connector, characterising the specified (long term) withstand capability of its insulation

NOTE The rated insulation voltage is not necessarily equal to the rated voltage which is primarily related to functional performance.

[EN 60664-1:2007, 1.3.9.1]