SLOVENSKI STANDARD
SIST EN 50702:2021

01-september-2021

Železniške naprave - Vozna sredstva - Tokovni odjemniki s tretje tirnice (čevlji) - Karakteristike in preskusi

Railway applications - Rolling stock - Third rail current collectors (shoegear): Characteristics and tests

Ta slovenski standard je istoveten z: EN 50702:2021

ICS:

45.060.10 Vlečna vozila Tractive stock

SIST EN 50702:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50702

May 2021

ICS 45.060.10

English Version

Railway applications - Rolling stock - Conductor rail current collectors (shoegear): Characteristics and tests

Applications ferroviaires - Matériel roulant - Appareil de prise de courant sur le rail de contact (capteur de courant) : Caractéristiques et essais

Bahnanwendungen - Fahrzeuge - Stromabnehmer für Stromschienen (Schleifschuhträger): Merkmale und Prüfungen

This European Standard was approved by CENELEC on 2021-04-12. 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (EN 50702:2021) has been prepared by CLC/SC 9XB, "*Electrical, electronic and electromechanical material on board rolling stock, including associated software*".

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)	2022-04-12
—	latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2024-04-12

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Introduction

This document corresponds to the aim of the EN 50206 series.

The electrical power of a transmission unit is achieved by collecting current from a conductor rail by means of one or more current collector(s), which is/are installed on the traction unit or on a vehicle of the trainset.

The collector shoes of the current collector which slide along the conductor rail facilitate the transmission of electric power.

The current collector and the conductor rail form two oscillating sub-systems which can be displaced. There is a unilateral sliding linkage between them, which ensures continuous contact. Their design should allow for minimum wear of both sub-systems when in operation.

1 Scope

This document specifies the tests for the current collectors to enable current collection from the third or fourth rail system as well as associated fuses and short circuit devices. It also specifies the general assembly characteristics to be applied to current collectors. This document is applicable to all types of vehicles with third or fourth rail current collectors. This document does not apply to roof mounted pantographs.

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 50123-1:2003, *Railway applications - Fixed installations - D.C. switchgear - Part 1: General*

EN 50124-1:2017, *Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment*

EN 50125-1:2014, *Railway applications - Environmental conditions for equipment - Part 1: Rolling stock and on-board equipment*

EN 50125-2:2002, *Railway applications - Environmental conditions for equipment - Part 2: Fixed electrical installations*

EN 50125-3:2003, *Railway applications - Environmental conditions for equipment - Part 3: Equipment for signalling and telecommunications*

EN 50163:2004, *Railway applications - Supply voltages of traction systems*

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

EN 60112:2003,[1] *Method for the determination of the proof and the comparative tracking indices of solid insulating materials (IEC 60112:2003)*

EN 60529:1991,[2] *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60587:2007, *Electrical insulating materials used under severe ambient conditions - Test methods for evaluating resistance to tracking and erosion (IEC 60587:2007)*

EN 61373:2010,[3] *Railway applications - Rolling stock equipment - Shock and vibration tests (IEC 61373:2010)*

[1] As impacted by EN 60112:2003/A1:2009.
[2] As impacted by EN 60529:1991/A2:2013 and EN 60529:1991/COR1:2019.
[3] As impacted by EN 61373:2010/AC:2017-09.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
current collector
equipment fitted to a vehicle and intended to collect current from a conductor rail

Note 1 to entry: Current collectors for conductor rail are also commonly known as shoegear.

[SOURCE: IEC 60050-811:2017, 811-32-01, modified — The term “contact wire or” has been omitted; Note 1 to entry has been added.]

3.2
collector shoe
part of the current collector making contact with the conductor rail

[SOURCE: IEC 60050-811:2017, 811-32-20, modified — The term “shoe gear” was replaced by “current collector”.]

3.3
type test
conformity test made on one or more items representative of the production

[SOURCE: IEC 60050-151:2001, 151-16-16]

3.4
routine test
conformity test made on each individual item during or after manufacture

[SOURCE: IEC 60050-151:2001, 151-16-17]

3.5
gauge
cross-sectional dimensions defining the maximum permitted dimensions of vehicles or the minimum dimensions of fixed structures

[SOURCE: IEC 60050-811:2017, 811-09-01, modified – The note 1 to entry has been omitted]

3.6
weak link
area of the collector shoe holder or collector shoe which is bound to break as a result of an impact with a foreign body

Note 1 to entry: The weak link, as a frangible section, is calibrated to break when the energy to be absorbed in the equipment exceeds the limit at which the frangible section is bound to be compromised.

3.7
retraction
function aimed to remove the collector shoe from the conductor rail, where the mechanism is positioned such as to make sure no current will draw through the current collector and the whole circuitry is fully insulated from the conductor rail

3.8
on rail position
running position of the collector shoe at which it touches the conductor rail and at which it is able to draw the electrical power dependent upon the track load conditions

3.9
retracted position
position where the collector shoe is retracted from the conductor rail by the means of a mechanism (pneumatic or manual) system

3.10
contact force
<for the shoe> force applied by the collector shoe on the conductor rail when the collector shoe is in the on rail position

3.11
rated voltage
<for current collector> voltage value assigned by a manufacturer or other entity for a specified operating condition of a component, device or equipment

[SOURCE: IEC 60050-614:2016, 614-03-09, modified — The notes 1, 2 and 3 to entry have been omitted.]

3.12
rated current at standstill
average value of the current withstand for a given time by the current collector at standstill

3.13
maximum current at standstill
maximum value of the current withstand by the current collector at standstill for a given time

3.14
rated current at running
continuous current transfer capacity of the current collector

3.15
short circuit current
maximum current that the current collector is expected to withstand under abnormal conditions, when there is a fault and the protection system has been operated to protect against fault

Note 1 to entry: Typical fault clearance times varying from a few tens of milliseconds through to half a second dependent upon the protection operation.

3.16
conductor rail
rigid metallic conductor mounted on insulators intended to interface with a vehicle mounted current collector and placed alongside (third rail) or between the rails (fourth rail) of a railway track

Note 1 to entry: It is used typically in a mass transit or rapid transit system, which has alignments in its own corridors, fully or almost fully segregated from the outside environment. Conductor rail systems are always supplied from direct current electricity.

[SOURCE: IEC 60050-811:2017, 811-34-01, modified — “placed alongside (third rail) or between the rails (fourth rail) of a railway track” has been added. Note 1 to entry has been changed. The Note 2 to entry has been omitted.]

3.17
load case
case according to which the load of a vehicle is defined

Note 1 to entry: The different cases are the following:

— AW0: weight of empty, ready-to-run vehicle,

— AW1: AW0 plus full seated load, including crew,

— AW2: AW1 plus standees at 4 passengers per m2,

— AW3: AW1 plus standees at 6 passengers per m2,

— AW4: AW1 plus standees at 8 passengers per m2.

Note 2 to entry: A weight of 75 kg per passenger is assumed.

4 Abbreviations

AC: Alternative Current

DC: Direct Current

GPS: Global Positioning System

IP: International Protection

UV: Ultra-Violet

5 Technical requirements

5.1 General

All general characteristics are given in the customer specifications. Unless otherwise specified, environmental conditions are defined in EN 50125-1:2014. The category of environment shall be specified by the customer.

5.2 Gauge

The current collector in all positions shall be inside the specified gauge which is provided by the customer.

5.3 Working range of the current collector

The customer specification shall state the values for the working range (distance and angle).

5.4 Electrical values

The supply voltages of traction systems are specified in EN 50163:2004. The customer specifications shall also state the duration and values of the exceptional voltages for the current collector operation. Values defined in EN 50163:2004, 3.14 to 3.18 shall be given in the customer specifications.

5.5 Force requirements

Static contact forces measured during raising and lowering of the collector shoe shall lie within the boundaries defined in the customer specification.

5.6 Collector shoe

The customer specification shall state the material of the collector shoe. Requirements for special collector shoe shapes shall be specified by the customer.

5.7 Operating system

The operating system shall be specified by the customer (pneumatic, hydraulic, electric and/or mechanical actuated). The operation system shall be designed such that the collector shoe can be disconnected from the conductor rail within 2 s for preventing electrical flashes.

5.8 Weak link

If required in the customer specification, a weak link shall allow a rupture of the collector shoe holder or collector shoe in the event of a collision.

5.9 Current collector mass and force in the bogie

The supplier shall specify the mass of the current collector and the maximum force at every fixing point. Additionally, the supplier shall specify all relevant parameters to enable the calculation of the maximum efforts at every fixing point.

5.10 Protection against corrosion

The requirements for the corrosion protection application and the type of corrosion protection shall be given in the customer specification.

6 Marking

As a minimum, the following shall be labelled on the current collector:

a) manufacturer's name

b) article number

c) serial number

d) revision or modification level

If requested by the customer:

1) Nominal Voltage

2) type of current collector

3) weight of current collector

4) nominal current

Taking into consideration operation in a railway environment, the name plate shall be readable after cleaning and in built-in condition

7 Tests

7.1 Categories of tests

7.1.1 Overview

There are four categories of tests:

a) type tests

b) routine tests

c) investigation tests

d) combined tests

The tests, mentioned above, are described in 7.1.2 to 7.1.5. See also Annex A.