

**Raudteealased rakendused. Püsipaigaldised.
Elektertransport. Vasest ja vasesulamitest
kontaktjuhtmed**

**Railway applications - Fixed installations - Electric
traction - Copper and copper alloy grooved contact
wires**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 50149:2012 sisaldab Euroopa standardi EN 50149:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 50149:2012 consists of the English text of the European standard EN 50149:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 08.06.2012.	Date of Availability of the European standard is 08.06.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 29.280

Võtmesõnad: copper, copper alloys, electric traction, electrical conductor, overhead line, railway equipment, railway fixed equipment, specification,

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Aru 10, 10317 Tallinn, Eesti; www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:
Aru 10, 10317 Tallinn, Estonia; www.evs.ee; phone 605 5050; e-mail info@evs.ee

English version

**Railway applications -
Fixed installations -
Electric traction -
Copper and copper alloy grooved contact wires**

Applications ferroviaires -
Installations fixes -
Traction électrique -
Fil rainurés en cuivre et en cuivre allié

Bahnanwendungen – Ortsfeste Anlagen –
Elektrischer Zugbetrieb – Rillenfahrdrähte aus
Kupfer und Kupferlegierung

This European Standard was approved by CENELEC on 2012-04-30. 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, 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.

CENELEC

European Committee for Electrotechnical Standardization

Comité Européen de Normalisation Electrotechnique

Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Contents

Page

Foreword.....	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Characteristics of wires	6
4.1 Wire designation system.....	6
4.2 Material designation.....	7
4.3 Appearance and condition.....	7
4.4 Identification.....	7
4.4.1 General requirements.....	7
4.4.2 Normal and high strength copper (CuETP, CuFRHC, CuHCP, CuOF).....	8
4.4.3 Copper-silver alloy (CuAg 0,1).....	8
4.4.4 Copper-cadmium alloy (CuCd 0,7, CuCd 1,0)	8
4.4.5 Copper-magnesium alloy (CuMg 0,2, CuMg 0,5)	8
4.4.6 Copper-tin alloy (CuSn 0,2, CuSn 0,4)	8
4.5 Configuration, profile and cross sections.....	9
4.5.1 Clamping grooves	9
4.5.2 Cross-section areas.....	10
4.5.3 Profiles.....	10
4.5.4 Configurations	10
4.6 Electrical properties	10
4.6.1 Resistivity	10
4.6.2 Resistance per kilometre	11
4.7 Mechanical properties.....	12
4.7.1 Tensile strength and percentage elongation after fracture.....	12
4.7.2 Additional requirements.....	15
4.7.3 Microwaves on longitudinal axis of wire.....	15
4.8 Joining drawing stock or intermediate rod stock	15
5 Checking the characteristics of wires	16
5.1 Material composition.....	16
5.2 Appearance and condition.....	16
5.3 Profiles and dimensions	16
5.4 Electrical properties	16
5.5 Mechanical properties.....	16
5.5.1 Breaking load and percentage elongation after fracture.....	16
5.5.2 Reverse bend test.....	17

5.5.3	Torsional strength test.....	19
5.5.4	Winding property test	19
5.5.5	Microwaves on longitudinal axis of wire	19
5.6	Mass per unit length.....	20
5.7	Joining of wire	20
5.8	Integrity of wire.....	20
6	Ordering and delivery conditions	20
6.1	Conditions and specification of the order	20
6.2	Packaging.....	21
6.3	Tolerance on wire length	21
6.4	Wire drum markings	21
7	Verification of compliance.....	21
7.1	Certification of compliance and test results.....	21
7.2	Selection of sample and tests by manufacturer.....	21
7.3	Inspection by customer	22
Annex A (normative) Standardised configurations.....		23
Annex B (informative) Common alloy compositions and designations		30
Annex C (informative) Physical properties		31
Annex D (informative) A-deviations.....		33
Annex E (normative) Special national conditions		34

Tables

Table 1- Configurations and cross sections.....	10
Table 2 - Maximum resistivity	11
Table 3 - Maximum resistance / kilometre	12
Table 4 - Tensile strength and percentage elongation after fracture	13
Table 5 - Breaking loads	14
Table 6 - Guide for selection of samples	22
Table B.1 – Some possible material compositions and designations.....	30
Table C.1 - Wire mass	32

Figures

Figure 1 - Set out of identification groove	8
Figure 2 - Two identification grooves	9
Figure 3 - One identification groove	9
Figure 4 - Three identification grooves	9
Figure 5 - One offset identification groove.....	9
Figure 6 - Clamping groove types.....	9
Figure 7 – Limit on microwaves in wire.....	15
Figure 8 – Reverse bend test – Test rig	18
Figure 9 - Reverse bend test - Method	19
Figure A.1 - Configuration of AC-80 contact wire	23
Figure A.2 - Configuration of AC-100 contact wire	23
Figure A.3 - Configuration of AC-107 contact wire	24
Dimensions in millimetres.....	24
Figure A.4 - Configuration of AC-120 contact wire	24
Figure A.5 - Configuration of AC-150 contact wire	25
Figure A.6 - Configuration of BC-100 contact wire	25
Figure A.7 - Configuration of BC-107 contact wire	26
Figure A.8 - Configuration of BC-120 contact wire	26
Figure A.9 - Configuration of BC-150 contact wire	27
Figure A.10 - Configuration of BF-100 flat bottom contact wire	27
Figure A.11 - Configuration of BF-107 flat bottom contact wire	28
Figure A.12 - Configuration of BF-120 flat bottom contact wire	28
Figure A.13 - Configuration of BF-150 flat bottom contact wire	29
Figure E.1 - Clamping groove types	34
Figure E.2 – Configuration of CF-100 and CF-120 contact wire	35

Foreword

This document (EN 50149:2012) has been prepared by CLC/SC 9XC "Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)".

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) 2013-04-30
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-04-30

This document supersedes EN 50149:2001.

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 specifies the characteristics of copper and copper alloy wires of cross sections of 80 mm², 100 mm², 107 mm², 120 mm² and 150 mm² for use on overhead contact lines.

It establishes the product characteristics, the test methods, checking procedures to be used with the wires, together with the ordering and delivery condition.

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 1655:1997, *Copper and copper alloys — Declarations of conformity*

EN 1977:1998, *Copper and copper alloys — Copper drawing stock (wire rod)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1)*

EN 10204:2004, *Metallic products — Types of inspection documents*

IEC 60468:1974, *Method of measurement of resistivity of metallic materials*

ISO 7801:1984, *Metallic materials — Wire — Reverse bend test*

3 Terms and definitions

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

3.1

drawing stock or intermediate rod stock

wire generally of circular shape, whose cross section is larger than the wire cross section, from which the contact wire is then drawn

3.2

wire

electric conductor of an overhead contact line with which the current collector makes contact and is characterised by two clamping grooves

Note 1 to entry The wire herein after will be referred to as wire or wires.

4 Characteristics of wires

4.1 Wire designation system

The wire designation shall consist of

- denomination (Wire);
- number of this European Standard (EN 50149);