

## SLOVENSKI STANDARD SIST EN IEC 63248:2023

01-april-2023

Nadomešča: SIST EN 61232:1996 SIST EN 61232:1996/A11:2002

Vodniki za nadzemne vode - Prevlečena ali prekrita kovinska žica za koncentrično pletene vodnike (IEC 63248:2022)

Conductors for overhead lines - Coated or cladded metallic wire for concentric lay stranded conductors (IEC 63248:2022)

Leiter für Freileitungen - Beschichtete oder ummantelte Metalldrähte für Leiter aus konzentrisch verseilten Drähten (IEC 63248:2022)

https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sist-Conductors for overhead lines - Coated or cladded metallic wire for concentric lay stranded conductors (IEC 63248:2022)

Ta slovenski standard je istoveten z: EN IEC 63248:2022

ICS: 29.240.20 Daljnovodi

Power transmission and distribution lines

SIST EN IEC 63248:2023

en,fr,de



## iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN IEC 63248:2023</u> https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sisten-iec-63248-2023

#### **SIST EN IEC 63248:2023**

## EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

### EN IEC 63248

May 2022

ICS 29.060.01; 29.240.20

Supersedes EN 61232:1995/corrigendum Feb. 1996, EN 50189:2000, EN 61232:1995 + A11:2000

**English Version** 

### Conductors for overhead lines - Coated or cladded metallic wire for concentric lay stranded conductors (IEC 63248:2022)

Conducteurs pour lignes aériennes - Fil métallique revêtu ou recouvert pour conducteurs toronnés à couches concentriques (IEC 63248:2022) Leiter für Freileitungen - Beschichtete oder ummantelte Metalldrähte für Leiter aus konzentrisch verseilten Drähten (IEC 63248:2022)

This European Standard was approved by CENELEC on 2022-04-08. 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.

#### <u>SIST EN IEC 63248:2023</u>

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

#### EN IEC 63248:2022 (E)

### European foreword

The text of document 7/715/FDIS, future edition 1 of IEC 63248, prepared by IEC/TC 7 "Overhead electrical conductors" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63248:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2023-04-11 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2025-04-11 document have to be withdrawn

This document supersedes EN 61232:1995 and EN 50189:2000, and all of their amendments and corrigenda (if any).

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

### Endorsement notice

The text of the International Standard IEC 63248:2022 was approved by CENELEC as a European Standard without any modification.



Edition 1.0 2022-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Conductors for overhead lines – Coated or cladded metallic wire for concentric lay stranded conductors

Conducteurs pour lignes aériennes – Fil métallique revêtu ou recouvert pour conducteurs toronnés à couches concentriques

https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sisten-iec-63248-2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.060.01; 29.240.20

ISBN 978-2-8322-1080-7

Warning! Make sure that you obtained this publication from an authorized distributor. Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

 Registered trademark of the International Electrotechnical Commission Marque déposée de la Commission Electrotechnique Internationale

### CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 Material	9
4.1 Steel	9
4.2 Aluminium	9
4.3 Zinc	9
4.4 Zinc-aluminium alloy	9
4.5 Advanced zinc-aluminium alloy	9
5 Freedom from defects	9
6 Joints	10
7 Tests	10
7.1 General	10
7.2 Place of testing	
7.3 Sampling rate	
7.4 Test methods	10
7.4.1 Visual test	10
7.4.2 Diameter	10
7.4.3 Stress at 1 % extension, tensile strength and elongation	11
7.4.4 Ductility tests	12
7.4.5 Coating or cladding tests	
7.4.6 Coefficient of linear expansion	14
7.4.7 Resistivity	14
7.4.8 Coating adherence heat resistance test	15
8 Acceptance and rejection	15
9 Certificate of compliance	15
10 Packaging	15
10.1 Type of packaging	15
10.2 Length and tolerance on length	15
Annex A (normative) Tables of properties for recommended IEC wire materials	16
Annex B (informative) Properties of wire for calculation purposes	31
Annex C (informative) Method to measure the equivalent diameter by volume	
Annex D (informative) Ratio of aluminium and steel or FeNi36 cross-sectional areas	35
D 1 Standard ratio in cross section	35
D 2 Average aluminium thickness	
Bibliography	
Figure C.1. Optical ground wire (OPCW) compared of formed eluminium clad steel	
wires	
Figure C.2 – Example of density measurement apparatus	
Table A 1 – Wire designation	16
Table A 2 - Schedule of tests	01 جد
Table A.2 – Schedule of lests	

IEC 63248:2022 © IEC 2022

- 3 -

Table A.3 – Zinc-aluminium alloy ingot composition (group 4 and group 5)	18
Table A.4 – Requirements for zinc and zinc-aluminium alloy coated steel wires(group 1, group 4 and group 5)	19
Table A.5 – Requirements for aluminium-clad FeNi36 wires (group 2)	23
Table A.6 – Requirements for aluminium-clad steel wires (group 3)	24
Table A.7 – Initial setting for determining stress at 1 % extension	27
Table A.8 – Coating requirements for zinc and zinc-aluminium alloy coated wires	28
Table A.9 – Cladding requirements for group 2 and group 3 wire	29
Table A.10 – Coating heat resistance test for group 4 and group 5 wire	29
Table A.11 – Temperatures for linear expansion test for group 2 wire	29
Table A.12 – Minimum number of dips for zinc and zinc alloy coatings (group 1,group 4, group 5)	30
Table B.1 – Properties of wire for calculation purposes	31
Table D.1 – Standard aluminium and steel or FeNi36 ratio in the cross section for group 2 and group 3 wires	35
Table D.2 – Average aluminium thickness	36

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 63248:2023

https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sisten-iec-63248-2023

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### CONDUCTORS FOR OVERHEAD LINES – COATED OR CLADDED METALLIC WIRE FOR CONCENTRIC LAY STRANDED CONDUCTORS

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63248 has been prepared by IEC technical committee 7: Overhead electrical conductors. It is an International Standard.

This first edition cancels and replaces the first edition of IEC 61232 published in 1993 and the first edition of IEC 60888 published in 1987. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous editions of IEC 61232 and IEC 60888:

- a) wire designations have been modified and grouped;
- b) wires with zinc coating class 2 were removed;
- c) new wire designations have been added;
- d) aluminium-clad FeNi36 wires have been added;
- e) advanced zinc-aluminium alloy coated steel wires have been added.

IEC 63248:2022 © IEC 2022

- 5 -

The text of this International Standard is based on the following documents:

Draft	Report on voting
7/715/FDIS	7/720/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members\_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or NDARD PREVIEW
   amanded
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

#### INTRODUCTION

The purpose of this document is to group together similar wire materials that share the same general characteristics and therefore the same test procedures and requirements. Included in this document are existing wire types from IEC 60888 and IEC 61232 as well as new wire materials that are already in use around the world in new types of conductors.

Zinc coating class 2 according to IEC 60888 has not been included in this document, as the demand for this class of zinc coating is extremely rare. Extra corrosion protection can be provided by other means, including the use of zinc-aluminium alloy coatings.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 63248:2023

https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sisten-iec-63248-2023

### CONDUCTORS FOR OVERHEAD LINES – COATED OR CLADDED METALLIC WIRE FOR CONCENTRIC LAY STRANDED CONDUCTORS

#### 1 Scope

This document specifies the properties of wires in the diameter range of, but not limited to, 1,25 mm to 5,50 mm. This document is applicable to coated or cladded metallic wires before stranding used either as concentric lay overhead stranded conductors, or in the manufacture of cores for concentric lay overhead stranded conductors, for power transmission purposes.

The various wire types and their designations are listed in Table A.1. For calculation purposes the values listed in Annex B are used.

#### 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.

IEC 60050 (all parts), International Electro-technical Vocabulary (IEV) (available at www.electropedia.org)

IEC 60468, Method of measurement of resistivity of metallic materials

ISO 752, Zinc ingots h.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sisten-iec-63248-2023

ISO 6892-1, Metallic materials – Tensile testing – Part 1: Method of test at room temperature

ISO 7500-1, Metallic materials – Calibration and verification of static uniaxial testing machines – Part 1: Tension/compression testing machines – Calibration and verification of the forcemeasuring system

ISO 7800, Metallic materials – Wire – Simple torsion test

ISO 7801, Metallic materials – Wire – Reverse bend test

ISO 7802, Metallic materials – Wire – Wrapping test

ISO 7989-2, Steel wire and wire products – Non-ferrous metallic coatings on steel wire – Part 2: Zinc or zinc-alloy coating

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050 (all parts) and the following apply.

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

- 8 -

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

#### 3.1

#### cladded metallic wire

result of a process by which a metal is bonded under high pressure by co-rolling, co-extrusion, or other, onto a wire creating a metallic bond between them

#### 3.2

#### class

number attributed to aluminium-clad wires for the purpose of providing an approximate conductivity value

#### 3.3

#### coated metallic wire

result of a process by which a metal is deposited onto a wire by hot-dip or electrolytic process, creating a chemical or metallic bond between them

#### 3.4

#### equivalent diameter

diameter of a round wire, which would have the same cross sectional area as a given formed wire

#### 3.5

### formed wire

drawn or rolled metal wire having a constant non-circular cross-section

SIST EN IEC 63248:2023

3.6 tps://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sist-

designation given to wire types that share a common coating or cladding, or property, for a similar purpose

#### 3.7

#### FeNi36

group

grade of steel-nickel alloy designed to have a very low coefficient of thermal expansion

### 3.8

#### lot

group of production units of one type and size of wire, which was manufactured by the same manufacturer during the same time period under similar conditions of production

Note 1 to entry: A lot can consist of part or all of a purchased quantity.

#### 3.9

#### nominal

value of a measurable property to which tolerance is applied

Note 1 to entry: Nominal values are target values.

#### 3.10

#### production unit

coil, reel, spool, or other package of wire that represents a single usable length

#### 3.11

#### sample

specimen or specimens removed from a production unit or units and considered to have properties representative of a lot

#### 3.12

#### specimen

length of wire removed for test purposes

#### 3.13

#### zinc-aluminium alloy

mixture of zinc and aluminium coating applied onto the wire for the purpose of protecting it against corrosion

Note 1 to entry: Some of these alloys with particular mixture are called mischmetal.

#### 3.14

#### advanced zinc-aluminium alloy

zinc-aluminium alloy reaching specific requirements as specified in ISO7989-2

Note 1 to entry: Examples of advanced zinc-aluminium alloys are Zn90 % + 10 % aluminium and Zn95 % + 5 % aluminium with 0.2 % to 0.5 % magnesium.

#### 4 Material

## iTeh STANDARD PREVIEW

#### 4.1 Steel

The base metal shall be steel produced by the open hearth, electric furnace, or basic oxygen process and shall be of such composition that the finished wire shall have the properties and characteristics given in this document.

https://standards.iteh.ai/catalog/standards/sist/5175fb31-8af9-4fa0-bd8f-19e15c6e04ab/sist-4.2 Aluminium

The aluminium used for coating or cladding shall have a minimum purity of 99,5 % and be of sufficient quality to meet the thickness and electrical resistance requirements of this document.

#### 4.3 Zinc

The ingot of zinc used for coating shall meet the requirements of ZN-3 in accordance with ISO 752.

The zinc coating shall be applied by either the hot-dip or electroplating method. Unless agreed between the purchaser and the manufacturer, the method of coating shall be at the discretion of the manufacturer.

#### 4.4 Zinc-aluminium alloy

The ingot of zinc-aluminium alloy used for coating shall be in accordance with Table A.3.

#### 4.5 Advanced zinc-aluminium alloy

The ingot of advanced zinc-aluminium alloy used for coating shall be in accordance with Table A.3.

#### 5 Freedom from defects

The wires shall be smooth and free from all imperfections such as cracks, roughness, grooves, inclusions and other defects which can compromise the performance of the final product.