SLOVENSKI STANDARD
SIST EN 50189:2000

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Vodniki za nadzemne vode – Pocinkana jeklena žica

Conductors for overhead lines - Zinc coated steel wires

Leiter für Freileitungen - Verzinkte Stahldrähte

Conducteurs pour lignes aériennes - Fils d'acier zingué

Ta slovenski standard je istoveten z: **EN 50189:2000**

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29.060.10	Žice	Wires
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EUROPEAN STANDARD

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English version

Conductors for overhead lines Zinc coated steel wires

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Fils d'acier zingué

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 7, Overhead electrical conductors.

The text of the daft was submitted to the formal vote and was approved by CENELEC as EN 50189 on 1999-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01

Annexes designated "normative" are part of the body of the standard;
In this standard, annex A is normative.

Contents

1 Scope

This standard applies to round zinc-coated steel wires used in the construction and/or reinforcement of conductors for overhead power transmission purposes.

It is intended to cover all wires used in constructions where the individual wire diameters, including coating, are in the range of 1,25 mm to 5,50 mm.

Types of wire are designated STyz, where y represents the grade of steel and z represents the class of zinc coating.

To reflect the needs of conductor users, the only combinations of steel grade and zinc coating covered by this standard are ST1A, ST2B, ST3D, ST4A, ST5E and ST6C.

The properties specified are those before stranding.

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 10002-1	*Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*
EN 10021	*General technical delivery conditions for steel and steel products*
EN 10218-1	*Steel wire and wire products — General — Part 1: Test methods*
EN 10244-2[1)]	*Steel wire and wire products — Non-ferrous metallic coatings on steel wire Part 2: Zinc or zinc alloy coatings*
IEC 60050-466	*International Electrotechnical Vocabulary (IEV) — Chapter 466: Overhead Lines*
ISO 7801	*Metallic materials — Wire — Reverse bend test*

3 Definitions

In addition to the definitions given in IEC 60050-466, the following definition applies:

3.1
lot
a group of reels or coils manufactured by the same manufacturer under similar conditions of production

NOTE 1 A lot may consist of part of or all the purchased quantity.

NOTE 2 The constitution of a lot may be agreed between the purchaser and the manufacturer.

1) In preparation

4 Values for zinc-coated steel wires

For calculation purposes the following values for zinc-coated steel wires shall be used:

Density at 20°C	7,78 kg/dm^3
Coefficient of linear expansion	11,5 x 10^{-6} K^{-1}
Modulus of elasticity	207 000 N/mm²
Resistivity at 20°C	192 nΩ·m

NOTE For more accurate calculations, measured values may be used.

5 Material

The steel wires shall have the properties specified hereinafter. The slab zinc shall be of 99,85 % minimum zinc content. The coating on the wires may be applied by the hot dip or electrolytic process, as agreed between the purchaser and manufacturer.

6 Wire surface

The wire surface, before and after coating, shall be free from cracks, holes, inclusions of impurities, and any other imperfections which may detract from its functional performance as a wire for an electrical conductor.

7 Diameter and tolerance on diameter

The diameter of the zinc-coated steel wire, expressed to two decimal places, shall not depart from the nominal diameter by more than the tolerance given in Tables 3 to 8.

8 Length and tolerance on length

Unless otherwise agreed between the purchaser and manufacturer, steel wires shall be supplied with a minimum length specified by the purchaser with a permitted variation of - 0, + 4 %. Random lengths shorter or longer than this requirement are only acceptable if prior agreement between the purchaser and manufacturer is made.

9 Joints

Joints are allowed in the base hot rolled rod and semi-finished wire by the electric butt or flash welding process, before or after heat treatment and prior to final drawing. Joints which have been made in rod or during processing shall, after drawing to the final diameter, have a minimum tensile strength not less than 80 % of that obtained on a test on wire which has not been jointed.

The manufacturer shall demonstrate that the proposed welding method is capable of meeting the specified requirements. Other required values for such wires are not changed except that the finished wire from that portion of the rod which was welded shall not be required to pass ductility wrapping tests.

When the zinc coating has been removed in the course of welding prior to final drawing, the wire shall be suitably recoated by agreement between the purchaser and the manufacturer.

No joints of any kind shall be made in the coated steel wires at final diameter.

No joint shall be made after heat treatment in wires destined to be used in conductors containing only one steel wire.

A drum or coil containing wire which has been welded after heat treatment shall be clearly marked.

10 Sampling

One sample for tests shall be taken, in accordance with EN 10021, by the manufacturer from at least 10 % of the individual lengths of coated steel wire. In cases of wire supply in large quantities and where the manufacturer has a demonstrated capability of meeting or exceeding the requirements, the number of test samples may be reduced, with the agreement of the purchaser and the manufacturer, to a level which ensures that each production lot of wire is given adequate monitoring.

11 Tests

11.1 Visual test

When inspected with the naked, or normally corrected eye the surface of the wire shall be free from cracks, holes, and inclusions of impurities.

11.2 Diameter

The minimum and maximum diameter shall be determined at the same cross section. Each of these measurements shall lie within the tolerance given in Tables 3 to 8.

It is recognised that the surface of zinc coatings, particularly those produced by hot dip galvanising, are not perfectly smooth and free from irregularities. It is, therefore, intended that these tolerances be used in measuring the diameters within the uniform areas of zinc-coated wire.

For calculation of the cross-sectional area, the mean of the two measurements shall be used.

11.3 Stress at 1% extension

The test shall be made in accordance with EN 10002-1 on the coated wire at final diameter.

One specimen from each of the test samples shall be gripped in the jaws of the tensile machine. An initial load equivalent to the initial stress given in Table 1 shall be applied and an extensometer applied on a 250 mm gauge length and adjusted to the initial setting given in Table 1 (other gauge lengths may be used if agreed between the purchaser and the manufacturer. In this case the initial setting of the extensometer shall be adjusted according to the note in Table 1). The gauge length shall be marked on the wire prior to application of load when it is required for subsequent measurements. The distance between the jaw and the gauge length mark shall be at least 25 mm.

Table 1 - Initial stress and extensometer settings for determination of stress at 1 % extension

Nominal wire diameter mm		Initial stress	Initial setting of extensometer for a gauge length of 250 mm*
Over	Up to and including	N/mm²	
1,24	2,25	100	0,125
2,25	3,00	200	0,250
3,00	4,75	300	0,375
4,75	5,50	400	0,500
* For other gauge lengths, multiply the intial setting by the gauge length in mm divided by 250.			

The initial load shall then be increased uniformly until the extensometer indicates an extension of 1 % of the original gauge length. At this point the load shall be read, from which the value of the stress at 1 % extension shall be calculated by dividing this load by the area of the wire based on actual wire diameter measured before the load was applied. The value obtained for the specimen shall be not less than the value given in the appropriate column of Tables 3 to 8.

The specimen may subsequently be used for the tensile and elongation tests.

11.4 Tensile strength

The test shall be made in accordance with EN 10002-1 on the coated wire at final diameter.

The breaking load of one specimen cut from each of the test samples shall be determined by means of a suitable testing machine.

The load shall be applied uniformly above and below the 1% extension and the rate of increasing separation of the jaws of the testing machine shall be not less than 0,1 times the gauge length in millimetres per minute and not greater than 0,4 times the gauge length in millimetres per minute.

The ultimate tensile stress calculated by dividing the breaking load by the area of the wire based on actual wire diameter shall not be less than the value, corresponding to the nominal wire diameter, given in the appropriate column of Tables 3 to 8.

11.5 Ductility test

The choice between a test for permanent elongation after fracture and a torsion test is to be made at the discretion of the manufacturer, unless previously agreed between the purchaser and the manufacturer. The choice of one test or the other in no way prejudices the quality of steel used.

11.5.1 Elongation test (where chosen)

The permanent elongation after fracture (A_{250}), measured on a 250 mm gauge length in accordance with EN 10002-1, shall be not less than the value given in the appropriate column of Tables 3 to 8.

11.5.2 Torsion test (where chosen)

When specified in Tables 3 to 8, a specimen cut from each sample shall be given a simple torsion test, as described in EN 10218-1.

The number of twists, on a length 100 times the wire diameter, that causes fracture shall not be less than the value given in the appropriate column of Tables 3 to 8.