SLOVENSKI STANDARD
SIST EN 60851-3:2001/A1:2001

01-september-2001

Addition of annex B to EN

Winding wires - Test methods -- Part 3: Mechanical properties

Wickeldrähte - Prüfverfahren -- Teil 3: Mechanische Eigenschaften

Fils de bobinage - Méthodes d'essai -- Partie 3: Propriétés mécaniques

Ta slovenski standard je istoveten z: **EN 60851-3:1996/A1:1997**

ICS:

29.060.10 Žice Wires

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English version

Winding wires - Test methods
Part 3: Mechanical properties
(IEC 60851-3:1996/A1:1997)

Fils de bobinage - Méthodes d'essai
Partie 3: Propriétés mécaniques
(CEI 60851-3:1996/A1:1997)

Wickeldrähte - Prüfverfahren
Teil 3: Mechanische Eigenschaften
(IEC 60851-3:1996/A1:1997)

This amendment A1 modifies the European Standard EN 60851-3:1996; it was approved by CENELEC on 1997-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 Central Secretariat or to any CENELEC member.

This amendment 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 Central Secretariat has the same status as the official versions.

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CENELEC

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

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Foreword

The text of document 55/592/FDIS, future amendment 1 to IEC 60851-3:1996, prepared by IEC TC 55, Winding wires, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60851-3:1996 on 1997-10-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-07-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1998-07-01

Endorsement notice

The text of amendment 1:1997 to the International Standard IEC 60851-3:1996 was approved by CENELEC as an amendment to the European Standard without any modification.

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60851-3

1996

AMENDEMENT 1
AMENDMENT 1

1997-08

Amendement 1

Fils de bobinage – Méthodes d'essai –

Partie 3: Propriétés mécaniques

Amendment 1

Winding wires – Test methods –

Part 3: Mechanical properties

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FOREWORD

This amendment has been prepared by IEC technical committee 55: Winding wires.

The text of this amendment is based on the following documents:

FDIS	Report on voting
55/592/FDIS	55/612/RVD

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

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Add the title of the new annex as follows:

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Add, at the end of annex A, the following new annex

Annex B
(informative)

Friction test methods

B.1 General

This annex provides recommendations to the purchaser and supplier of winding wires with respect to friction test methods to be used for winding wires.

B.2 Test A: Static coefficient of friction test method

B.2.1 *Method of test (applicable to enamelled round wires with a nominal conductor diameter from 0,050 mm up to and including 1,600 mm)*

The static coefficient of friction (μ_s) is determined by measuring the inclining angle (α) of a plane at the moment when a block begins to slip on the track made from the wire specimen. The wire test specimen shall be removed from the delivery spools by dereeling over the end flange. The top layers of the spool shall be removed before testing when the wire surface is contaminated by dirt or dust. One part of the wire specimen is straightened and then fixed on the inclining plane by means of the two posts and the two clamps constituting the sliding track. The other part of the wire specimen is mounted in a similar way on the sliding block.

The sliding block with the wire specimen is then placed on the track of the plane to be inclined in such a way that the wire on the block and the wire on the plane are crossed at right angles at the point of contact.

The plane is then slowly inclined (approximately 1 degree per second) until the block starts to slide down the track. At that moment, the angle of inclination (α) is read from the scale.

The static coefficient of friction is calculated as follows:

$$\mu_s = \tan \alpha$$

B.2.2 *Test apparatus*

The general arrangement of the test apparatus is shown in figure B.1.

The apparatus consists of a plane (1) which can be inclined to an angle (α) by turning the plane around the axis (8). The support (9) carries a scale (7) marked with the inclination angle (α) or the coefficient of friction ($\tan \alpha$).

The plane has means for fixing the wire specimen (3), for example the two posts (5) and the two clamps (6). The parallel parts of the wire shall be 110 mm apart. They form a sliding track running from the scale end to the axis on the plane.

On the block (2) clamps and posts are provided to fix the second wire specimen (4). The parallel parts of the specimen shall be 60 mm apart. The size of the block must allow the clamps and posts to stay clear of the plane (1) to avoid additional friction forces. The block shall have:

– a mass of about 50 g for a wire with a nominal conductor diameter up to and including 0,150 mm;

– a mass of about 500 g for a wire with a nominal conductor diameter over 0,150 mm.

The mass is not critical as it is anyway changed by the mass of the second wire specimen.

The angle of inclination shall be changed slowly by means of a motor-operated block and tackle.

B.3 Test B: First dynamic coefficient of friction test method

B.3.1 *Principle*

The coefficient of friction, μ_d, is determined by measuring the frictional force, *C*, applied on the wire when moving under the pressure of a known mass, *E*:

$$\mu_d = \frac{C}{9{,}81 \times E}$$

B.3.2 *Method of test*

The general arrangement of the test apparatus is shown in figure B.2.

The enamelled wire runs via a guide wheel and a brake (D) over a metal plate (B). Via another guide wheel, the wire is lead below this plate (B) and runs back, parallel with the first passage, over this plate again (see figure B.2). By means of a capstan (A), the wire is drawn with a speed of 0,25 m/s. A mass (E) is placed on the running wire over the plate (B) which is coupled to a force indication meter (C).

The force indication meter can be coupled to a linear recorder (measuring range 1 – 250 mV). This linear recorder shows the spread of the smoothness and the level of the wire smoothness over a long distance.

B.4 Test C: Second dynamic coefficient of friction test method

B.4.1 *Method of test (applicable to enamelled round wires with a nominal conductor diameter from 0,050 mm up to and including 1,600 mm)*

The wire specimen is pulled under a test load. The force is developed between the wire surface and the load contact surface and transferred to an appropriate measuring device. The reading in N is divided by the load in N for determination of the dynamic coefficient of friction (μ_d).

The wire test specimen shall be removed from the delivery spools by dereeling over the end flange or from the pail or drum. The top wire specimen layer of the spool shall be removed before testing if the wire specimen has been contaminated by dirt or dust.

Referring to figure B.4, level the smooth surface (6) using the levelling leg screws (2) and float level (8).

Adjust the electronic force transducer (5) (figure B.4) sensitivity to the appropriate range, and set chart recorder to full-scale setting for the wire size being tested using a calibrating weight (9) (figure B.3). The calibrating weight should be removed after the transducer and chart recorder are adjusted.

If a mechanical dynamometer (5) (figure B.4) is used, adjust the correct range for the wire size being tested.

- Nominal conductor diameters from 0,050 mm up to and including 0,125 mm: 0 – 0,49 N.
- Nominal conductor diameters over 0,125 mm up to and including 1,600 mm: 0 – 1,96 N.

Clean the sapphire surfaces located on the load block (3) (figure B.4) in contact with the wire with an appropriate cleaning solvent and allow time to dry thoroughly.

Lower the dampening paddle (4) (figure B.4) into the oil.

- Completely immerse for sizes over 0,224 mm up to and including 1,600 mm.
- Immerse one-half paddle for sizes from 0,050 mm up to and including 0,224 mm.

Thread the wire over appropriate guide pulleys (figures B.3 (4) and B.4 (9)) so that the wire is in contact with the two sapphires.

Apply the appropriate test load (7) (figure B.4):

- for sizes over 0,050 mm up to and including 0,071 mm: 0,98 N;
- for sizes over 0,071 mm up to and including 0,125 mm: 1,96 N;
- for sizes over 0,125 mm up to and including 0,450 mm: 5,88 N;
- for sizes over 0,450 mm up to and including 1,600 mm: 9,87 N.

The test load (7) (figure B.4) should be positioned on the test bed (6) (figure B.4) where no reading is indicated on the force transducer or dynamometer. If the mechanical dynamometer is used, it should be zeroed.

Adjust the calibrated dial (1) (figure B.4) to make the test load parallel with the test bed surface. Turn tester on and start the test wire moving.

Slight tension (1) (figure B.3) should be applied to keep the wire travelling smoothly.

To allow time for the start-up variations to cease, the average dynamometer reading to the nearest newton should be recorded at least 15 s after start-up.

Calculate the average coefficient of friction (μ_d) as follows:

$$\mu_d = \frac{F}{L}$$

where

F is the average dynamometer force reading, in newtons

L is the test load, in newtons.

B.4.2 *Test apparatus*

The general arrangement of the test apparatus is shown in figures B.3, B.4 and B.5.

A motor (3) (figure B.3) shall pull the wire specimen at 15 m/min across a smooth surface (10) (figure B.3) using a motor take-up (6) (figure B.3).