SLOVENSKI STANDARD
SIST EN 60851-3:2009/A1:2014

01-februar-2014

Navijalne žice - Preskusne metode - 3. del: Mehanske lastnosti - Dopolnilo A1 (IEC 60851-3:2009/A1:2013)

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 60851-3:2009/A1:2013

ICS:

29.060.10 Žice Wires

SIST EN 60851-3:2009/A1:2014 en

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60851-3/A1

September 2013

ICS 29.060.10

English version

Winding wires - Test methods - Part 3: Mechanical properties

(IEC 60851-3:2009/A1:2013)

Fils de bobinage -
Méthodes d'essai -
Partie 3: Propriétés mécaniques
(CEI 60851-3:2009/A1:2013)

Wickeldrähte -
Prüfverfahren -
Teil 3: Mechanische Eigenschaften
(IEC 60851-3:2009/A1:2013)

This amendment A1 modifies the European Standard EN 60851-3:2009; it was approved by CENELEC on 2013-09-04. 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 CEN-CENELEC Management Centre or to any CENELEC member.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60851-3:2009/A1:2013 E

Foreword

The text of document 55/1392/FDIS, future IEC 60851-3:2009/A1, prepared by IEC/TC 55 "Winding wires" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60851-3:2009/A1:2013.

The following dates are fixed:

– latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-06-04
– latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-09-04

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Endorsement notice

The text of the International Standard IEC 60851-3:2009/A1:2013 was approved by CENELEC as a European Standard without any modification.

IEC 60851-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

AMENDMENT 1
AMENDEMENT 1

Winding wires – Test methods –
Part 3: Mechanical properties

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

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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
55/1392/FDIS	55/1407/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.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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.

B.1 General

Replace this subclause by the following:

This annex provides recommendations to the purchaser and supplier of winding wires with respect to friction test methods to be used for winding wires. The use of additional methods can be agreed upon between purchaser and supplier.

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

Replace the entire clause by the following:

B.4 Test C: Second dynamic coefficient of friction test method (applicable to enamelled round wires with a nominal conductor diameter from 0,050 mm up to and including 1,600 mm)

B.4.1 Test equipment

The design of typical test equipment is illustrated in Figure B.3. Figure B.4 contains detailed drawings of synthetic sapphires and Figure B.5 is a photograph of the load block. The tester is supplied with a wire guiding system and a take-up which pulls the wire over the test bed at 15 m/min as shown in Figure B.6. The test block is aligned parallel with the test bed and the test weights are perpendicular to the wire specimen.

As the wire is pulled under the test block (synthetic sapphires), the friction between the wire surface and the sapphire surface develops a longitudinal force, which is transferred to the measuring system by a shaft supported by two sets of linear ball bearings in contact with the measuring system. The force indicated by the measuring system is divided by the load on the test surface to obtain the dynamic coefficient of friction.

The measuring system in Figure B.3 shows the dynamic coefficient of friction tester with a load cell in place to measure the force. An LVDT may also be used to measure the force instead of a load cell. The electrical output from the force measurement device is fed into a computer or into a microprocessor that collects data measurements, usually 1 000 points. Statistics are performed on this data set so that proper interpretation of the results can be made.

NOTE 1 Values for the dynamic coefficient of friction are characteristic of the type of lubrication and the magnet wire specimen surface. The dynamic coefficient of friction values are generally not dependent on wire size.

NOTE 2 Wire lubricated with a mineral oil typically will have a mean dynamic coefficient of friction in the range of 0,9 to 0,16. Wire lubricated with a paraffin wax will typically have a mean dynamic coefficient of friction ranging from 0,03 to 0,06 and will be more consistent in value as evidenced by a lower standard deviation. The mean value, maximum value and standard deviation value can be used to evaluate the application of the lubricant to the wire and smoothness of the wire surface.

The test procedure is designed to provide a measure of the lubrication and the film surface smoothness as a combined value. It is assumed that the wire will be de-reeled from its packaging with minimal contact with surfaces other than those associated with the tester and packaging.

If there is suspicion that the presence of dust or dirt may have an effect on the coefficient of friction, one or two outer layers of wire should be removed from the package and the sample retested.

Test surfaces in contact with the wire shall be clean and dry at the start of each separate test. The solvent used to clean the test load surface should remove the various types of lubricants used and should dry without leaving a film residue.

B.4.2 Test specimen

The surface of the wire should be examined for damage, tangles, or excessive dust or dirt. If any of these conditions are present, the top wire specimen layer of the spool should be surfaced off before testing. The wire test specimen should be removed from the shipping package by de-reeling over the end flange or pulling the wire from a pail or drum.

B.4.3 Specimen preparation

The wire specimen is pulled over a test bed surface under a test load (L). A frictional force (F_d) is developed between the wire surfaces and transferred to an appropriate measuring device. The reading (F_d) in grams-force is divided by the test load (L) in grams-force to obtain the dynamic coefficient of friction μ_d.

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

A motor should pull the wire specimen at 15 ± 1,5 m/min across a smooth surface using a motor driven take-up.

Various load weights should be available that will provide 100 – 1 000 grams-force.

The test block should be comprised of two mounted synthetic sapphires that have a surface roughness of not more than 2,4 microns. The sapphires are described in Figure B.4 and are mounted in accordance with Figure B.5.

There should be a means to guide the wire and a means to maintain a slight tension if needed.

An electrical force measuring device or transducer measures the force due to friction. A force transducer with a range of 0 – 500 grams-force, a data storage device, and a microprocessor or computer to statistically analyse the data sets should be installed.

A mechanical dampening system consisting of a paddle and a container filled with oil may be used. The electrical signals from the load cell or LVDT can also be dampened electronically.

A cleaning solvent appropriate for dissolving the lubricant being tested should be used for cleaning the sapphires and metal surfaces between tests.

B.4.4 Procedure

The coefficient of friction tester should be level so that the only force being measured by the pressure transducer is that which is perpendicular to the load being applied and that gravity is not a factor.

Calibrate the pressure transducer by setting the zero without any load, and setting the span by hanging a 100 or 200 gram weight. Remove the weight and the display should again read zero.

Enter the parameters of the test into the microprocessor or personal computer.

De-reel the wire from its packaging by pulling the wire over the flange, through the tensioning device, through the guides, and onto the take-up spindle.

Adjust the guide pulleys so that the wire is parallel with the test bed. Clean the test bed, any guide pulleys, and the sapphire surfaces with a suitable solvent.

Place the appropriate weight from Table B.1 onto the load block:

Table B.1 – Load block weights for dynamic coefficient of friction testing

Conductor diameter mm	Weight g
0,050 – 0,071	100
0,071 – 0,125	200
0,125 – 0,450	600
0,450 – 1,600	1 000

Adjust the test bed to make the test load parallel with the test surface. Turn the wire take up on and start collecting data after the setup is stable and aligned and continue until the desired number of data points has been stored.

Analyse the data for minimum reading, maximum reading, mean value, and standard deviation.

The dynamic coefficient of friction μ_d should be calculated as follows:

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

where

F_d = force reading in grams force

L = test load in grams force

B.5.2 Method of test

Replace, in the first paragraph of this subclause, the words "Figure B.6" *by* "Figure B.7" *and the words* "Table B.1" *by* "Table B.2".

Table B.1 – Twisted pair method

Re-designate the existing Table B.1 as Table B.2.

Figure B.3 – Dynamic coefficient of friction test apparatus

Replace Figure B.3 by the following: