



SLOVENSKI STANDARD
SIST HD 605 S1:1998/A3:2002
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Electric cables - Additional test methods - Amendment A3

Electric cables - Additional test methods

Elektrokabel - Ergänzende Prüfverfahren

Câbles électriques - Méthodes d'essai supplémentaires

Ta slovenski standard je istoveten z: HD 605 S1:1994/A3:2002

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ICS:

29.060.20 Kabli Cables

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HARMONIZATION DOCUMENT

HD 605 S1/A3

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

March 2002

ICS 29.060.20

English version

**Electric cables –
Additional test methods**Câbles électriques –
Méthodes d'essai supplémentairesElektrokabel –
Ergänzende Prüfverfahren

This amendment A3 modifies the Harmonization Document HD 605 S1:1994; it was approved by CENELEC on 2001-12-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this amendment on a national level.

Up-to-date lists and bibliographical references concerning such national implementation may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELECEuropean Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

Foreword

This amendment to HD 605 S1:1994 has been prepared by WG 9 of CENELEC TC 20 "Electric Cables". It is an amalgamation of two separate work items, both aimed at reducing the number of test methods. These work items cover

- seven so-called "easy-to-harmonise" general test methods,
- the long-duration test.

NOTE 1 This amendment, especially in respect of the long-duration test (see 5.4.15), necessitates corresponding amendments to HD 620. Each National Committee should ensure that their particular sections of HD 620, and their national implementations of the HD, have the appropriate amendments to the "Requirements" clause for the long-duration test. Such amendments should be incorporated into HD 620/A2 under the regular TC 20 maintenance schedule.

CENELEC TC 20 confirmed at its meeting in Lucerne (May 2000) that the consolidated amendment should go to the Unique Acceptance Procedure.

NOTE 2 Since the publication of HD 605 S1 (and A1 and A2) further changes have been made to other standards to which cross-reference is made in the original texts.

In particular:

- HD 405.3 has been replaced by EN 50266 (six parts);
- HD 606 has been replaced by EN 50268 (two parts).

In general the updating of these references has not been included in this amendment unless a complete test method has been introduced or replaced.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A3 to HD 605 S1:1994 on 2001-12-01.

The following dates were fixed:

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|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------|
| | SIST HD 605 S1:1998/A3:2002 | |
| - latest date by which the existence of the amendment has to be announced at national level | (doa) | 2002-06-01 |
| - latest date by which the amendment has to be implemented at national level by publication of a harmonized national standard or by endorsement | (dop) | 2002-12-01 |
| - latest date by which the national standards conflicting with the amendment have to be withdrawn | (dow) | 2004-12-01 |

2.1.4.3 Wires, strips and tapes for armour

Delete the existing text and **replace** as follows:

(a) round wires

Take at random 10 wires or 10 % of the total number of wires, whichever is the smaller, from a sample of the completed cable.

Determine the diameter of each wire of this sampling by taking two measurements at right angles to each other using a micrometer with flat noses to an accuracy of $\pm 0,01$ mm.

Take the average value as the wire diameter.

(b) flat wires or strips

Take at random 10 flat wires or strips or 10 % of the total number of flat wires or strips, whichever is the smaller, from a sample of the completed cable.

Determine the thickness and width of each flat wire of this sampling by using either a micrometer with flat noses to an accuracy of $\pm 0,01$ mm or a vernier calliper with flat noses to an accuracy of $\pm 0,02$ mm.

Take the average value as the wire thickness and wire width.

(c) metallic tapes thickness

Take and straighten a sample of each armour tape, remove the non-metallic coating if any, and determine the tape thickness at six different places.

The measurement shall be made with either a micrometer or a vernier calliper, both with two flat noses of approximately 5 mm in diameter, to a respective accuracy of $\pm 0,01$ mm or $\pm 0,02$ mm. For tapes up to 40 mm in width the thickness shall be measured at the centre of the width. For wider tapes the measurements shall be made 20 mm from each edge of the tape and the average of the results taken as the thickness.

Take the smallest value to be compared with the specified thickness with a tolerance given in the particular specification.

2.1.12.2 Method 2 - Measurements of armour dimensions

Delete the existing text and **replace** as follows:

See 2.1.4.3.

2.1.12.3 Method 3 - Measurements of armour dimensions

Delete the existing text and **replace** as follows:

See 2.1.4.3.

2.1.5 and 2.1.14 Measurement of thickness of metallic sheath

2.1.5 (a)

Change paragraph 2, line 5 as follows :with plane faces of 2 mm to 8 mm diameter....

2.1.14

Delete the existing text and replace as follows:

See 2.1.5.

2.1.8 Measurement of the gap between non-metallic tapes of taped bedding

Delete the existing text and replace as follows:

See 2.1.6.1.

2.1.13.2 and 2.1.13.3 Conductor diameter

Delete the existing text and replace as follows:

2.1.13.2 Method 1 - Conductor diameter

On a single section conductor piece, suitably tightened at the ends to prevent the wires splitting, measure the diameter of the circular conductor in accordance with 8.3 of IEC 60811-1-1, by taking two measurements at right angles to each other with an accuracy of 0,05 mm.

Take the average value as the conductor diameter.

2.1.13.3 Method 2 - Conductor diameter

See 2.1.13.2 .

2.3.1.1, 2.3.1.2 and 2.3.1.3 Tensile test on metallic components

Delete the existing text and replace as follows:

2.3.1.1 Method 1 - Aluminium and copper components

Take at random 10 % of the total number of wire or strips from one sample of completed cable. Measure the tensile strength of each wire or strip in accordance with EN 10002-1. Take the average of all the measurements to be the tensile strength.

The cross-sectional area shall be determined by weighing a test piece approximately 350 mm long of the component material. The test piece length shall be measured with an accuracy of $\pm 0,5$ mm, and the mass shall be measured with a tolerance of $\pm 0,02$ g. The specified mass density shall be taken as $2\,700\text{ kg/m}^3$ for aluminium and $8\,900\text{ kg/m}^3$ for copper.

The distance between two reference marks on the test piece shall be 200 mm and the distance between the grips of the tensile apparatus shall be approximately 250 mm. The speed of separation of the grips shall be at least 20 mm/min. The rate of increase of tensile stress shall not exceed $10\text{ N/mm}^2/\text{s}$.

The elongation at break shall be recorded as a percentage of the initial 200 mm distance between the reference marks.

If the sample breaks outside the reference marks, the test shall be repeated on another sample.

2.3.1.2 Method 2 - Aluminium conductors

See 2.3.1.1.

2.3.1.3 Method 3 - Aluminium and copper conductors

See 2.3.1.1.

3.16 Accelerated ageing test in relation to water treeing

(b) Actions

Delete paragraphs 1 and 2 of item (i) and **replace** as follows:

One or more representative 5 m active cable core lengths shall be selected from current manufacture at one of the following frequencies. The selected cable cores shall represent all cable types included in the delivery programme, in accordance with the provisions of subclause 5.4.15.

Treatment of the cable cores shall be in accordance with the provisions of subclause 5.4.15.

Delete item (ii) and **replace** as follows:

The cable core or cable cores as selected under subclause (b, i) shall be conditioned, aged and tested as specified in subclause 5.4.15.

The voltage step test as specified in subclause 5.4.15 shall be continued until breakdown occurs or at least up to 30 kV/mm.

5.4.3 Method 3 - Long term qualification test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.4 Method 4 - Long term qualification test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.5 Method 5 - Electrical long term test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.6 Method 6 – Watertree susceptibility test

Delete the existing text and **replace** as follows:

The test shall be carried out in accordance with 5.4.15.

As an alternative to ageing at power-frequency voltage, one 60 m active test length shall be energised at 500 Hz voltage for not less than 3 000 h. Otherwise, the conditioning, ageing procedure and ageing assessment shall be the same.

5.4.7 Method 7 - Accelerated ageing test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.8 Method 8 - Test for resistance to water

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.9 Method 9 - Long term qualification test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.10 Method 10 - Long term test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.11 Method 11 - Long term qualification test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.12 (d) Method 12 - Long term qualification test

Delete the existing text and **replace** as follows:

See 5.4.15.

5.4.13 Method 13 - Long term test for resistance to water and electrochemical treeing

Delete the existing text and **replace** as follows:

See 5.4.15.

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5.4.14 Method 14 – Long term qualification test for water tree resistance and chemical stability

Delete the existing text and replace as follows:

See 5.4.15.

Add new subclause 5.4.15 as follows:

5.4.15 Harmonised long duration test

5.4.15.1 Scope

This test method is intended to assess the resistance to water of extruded insulation cables for rated voltages from 3,6/6(7,2) kV to 20,8/36(42) kV.

The test shall be performed on production cable cores, insulated with either XLPE or EPR and having extruded semi-conducting conductor and insulation screens.

NOTE Cable cores submitted for testing may incorporate any conductor construction, including circular or shaped, solid or stranded, with or without water blocking.

5.4.15.2 Approval

Tests on one conductor construction with a cross-section in the range 95 mm² to 400 mm², copper or aluminium, shall provide approval for all conductor constructions and cross-sections.

Satisfactory completion of tests on cable core having a nominal insulation thickness of either 3,4 mm, 4,5 mm or 5,5 mm shall provide approval for all cables rated from 3,6/6 (7,2) kV to 20,8/36 (42) kV with the same combination of insulating and semi-conducting screening materials.

5.4.15.3 Test method

5.4.15.3.1 Cable core length

Two 60 m active lengths of cable core (excluding extra cable core required for terminations both for ageing and breakdown tests) shall be tested, using semi-conducting screened core with or without metallic screen wires.

5.4.15.3.2 Conditioning

The cable core shall be conditioned to remove remaining by-products of cross-linking and at the same time allow the insulation and screens to absorb moisture. Conditioning shall be as follows.

Cable cores with a nominal insulation thickness of either 3,4 mm, 4,5 mm or 5,5 mm shall be conditioned in a bath of tap water at a temperature of (55 ± 5) °C for at least 500 h, with the ends of the cable core protruding from the water.

NOTE Before commencing the ageing test, the cable core may be subjected to a power frequency voltage withstand test at (60 ± 3) kV, (90 ± 3) kV and (120 ± 5) kV for at least 1 min for 3,4 mm, 4,5 mm and 5,5 mm nominal insulation thicknesses respectively. If failure occurs, the sample may be replaced in order to exclude failures not related to water treeing and the test repeated.