



SLOVENSKI STANDARD

SIST HD 605 S1:1998

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Electrical cables - Additional test methods

Electric cables - Additional test methods

Elektrokabel - Ergänzende Prüfverfahren

Câbles électriques - Méthodes d'essai supplémentaires

Ta slovenski standard je istoveten z: **HD 605 S1:1994**

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Descriptors: Electric cable, test, dimension measuring, mechanical test, physical test, chemical test, electrical test, test of fire behaviour, thermal endurance test, classification, test conditions

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

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FOREWORD

This Harmonisation Document was prepared jointly by WG9 and WG10 of CENELEC Technical Committee TC20, Electric cables.

The document rationalises all those test methods which are additional to those in HD 405 and HD 505, and which were originally planned to be included in Part 2 of each of HD 603 (Distribution cables of rated voltage 0.6/1kV) and HD 604 (0.6/1kV Power Cables with special fire performance for use in power stations). Consequently there is no Part 2 for either HD 603 or HD 604. By decision of the Technical Board (D68/047) National Committees are only required to implement in their national language the nationally applicable parts of HD 603 and HD 604. Therefore not all test methods in HD 605 apply to both the other HDs, nor are they all called up by any particular nationally applicable part.

The draft was submitted to the CENELEC members for formal vote in March 1993 and was approved by CENELEC as HD 605 S1 on 8th December 1993.

References to other HDs, ENs and international standards are given in Annex III.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1994-06-01
- latest date of publication of
a harmonised national standard (dop) 1994-12-01
- latest date of withdrawal of
conflicting national standards (dow) 1994-12-01

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ELECTRIC CABLES
ADDITIONAL TEST METHODS

1 GENERAL

1.1 Scope

This HD collates and specifies the test methods to be used for testing polymeric insulated and sheathed electric cables, of rated voltage up to and including 0,6/1kV, intended for public distribution systems, and for use in power generating plants and sub-stations.

Test methods in this HD are additional to those already harmonised, eg HD 405 and HD 505, and are used for testing cable types specified in HD 603 and HD 604. In each case, these HDs give complementary information needed for the practical application to each specific type. Therefore the present HD as such is not sufficient for carrying out and evaluating the tests on electric cables.

Full test conditions (eg temperatures, durations) and/or test requirements are not specified in this HD. Such data needed to carry out the tests is given in the particular sections.

(NOTE: The words 'particular section' refer throughout to the section of HD 603 or HD 604, or other HD to which HD 605 applies, in which a particular cable type is specified.)

1.2 Applicable tests

Tests applicable to each type of cable are given in the particular section, which state also the sequence, the frequency of test, and the possibility of repeating failed tests.

1.3 Classification of tests

The classification of tests is given in Parts 1 of HD 603 and HD 604.

1.4 Sampling

The size and number of samples are given either in this HD or in the particular HDs.

If a marking is indented in the insulation or sheath surface, the samples used for the tests shall be taken so as to include such markings.

For multicore cables, except for the test specified in 2.1.1, not more than three cores (of different colours, if available) shall be tested unless otherwise specified.

1.5 Test conditions

1.5.1 Ambient temperature

Tests shall be made at an ambient temperature within the range 5°C to 35°C unless otherwise specified in the details for the particular test.

1.5.2 Tolerance on temperature values

Unless otherwise specified in the particular specification, the tolerance on temperature values quoted in the test methods are the following:

Specified Temperature, t(°C)	Tolerance (K)
-40 ≤ t ≤ 0	± 2
0 < t ≤ 50	according to relevant clause
50 < t ≤ 150	± 2
t > 150	± 3

1.5.3 Frequency and waveform of power-frequency test voltages

Unless otherwise specified the test voltage shall be in the range 49 to 61Hz of approximately sine-wave form, the peak ratio value/r.m.s. value being equal to $\sqrt{2}$ with a tolerance of ± 7%. The values given are rms.

1.5.4 Pre-conditioning

Unless otherwise stated the tests shall be carried out not less than 16h after the extrusion or cross-linking, if any, of the insulating or sheathing compounds.

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2 NON-ELECTRICAL TESTS

2.1 Dimensional measurements

2.1.1 Measurement of insulation thickness

2.1.1.1 Procedure

The thickness of insulation shall be measured in accordance with sub-clause 8.1 of HD 505.1.1. Unless otherwise specified one sample of cable shall be taken from each of three places.

Compliance shall be checked on each core of cables having up to five cores, and on the number of cores stated in the individual specification for cables with more than five cores.

If withdrawal of the conductor is difficult, it shall be stretched in a tensile machine or the piece of core shall be immersed in an appropriate liquid until the insulation becomes loose.

2.1.1.2 Evaluation of results

Unless otherwise specified the mean of the 18 values (expressed in millimetres) obtained from the three pieces of insulation from each core shall be calculated to two decimal places and rounded off as given below, and this shall be taken as the mean value of the thickness of insulation.

If in the calculation the second decimal figure is 5 or more, the first decimal figure shall be raised to the next number thus, for example, 1.74 shall be rounded off to 1.7 and 1.75 to 1.8.

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The lowest of all values obtained shall be taken as the minimum thickness of insulation at any place.

2.1.2 Measurement of non-metallic sheath thickness

2.1.2.1 Procedure

The thickness of sheath shall be measured in accordance with sub-clause 8.2 of HD 505.1.1. Unless otherwise specified one sample of cable shall be taken from each of three places.

2.1.2.2 Evaluation of results

The mean of all the values (expressed in millimetres) obtained from the three pieces of sheath shall be calculated to two decimal places and rounded off as given below, and this shall be taken as the mean value of the thickness of the sheath.

If in the calculation the second decimal figure is 5 or more, the first decimal figure shall be raised to the next number, thus, for example, 1.74 shall be rounded off to 1.7 and 1.75 to 1.8.

The lowest of all values obtained shall be taken as the minimum thickness of sheath at any place.

2.1.3 Measurement of cable dimensions

2.1.3.1 Measurement of overall dimensions

Unless otherwise specified the three samples taken in accordance with this HD, sub-clause 2.1.1 or 2.1.2 shall be used.

The measurement of the overall diameter of any circular cable and of the overall dimensions of flat cables with a major dimension not exceeding 15mm shall be carried out in accordance with sub-clause 8.3 of HD 505.1.1.

For the measurement of flat cables with a major dimension exceeding 15mm, a micrometer, a profile projector or similar equipment shall be used.

The mean of the values obtained shall be taken as the mean overall dimensions.

2.1.3.2 Measurement of ovality

For checking the ovality of circular sheathed cables, two measurements shall be made at the same cross-section of the cable, covering the maximum and minimum values.

2.1.4 Measurement of wires, strips and tapes

2.1.4.1 Conductor wires

Measurement of the diameter of conductor wires (class 5 conductors).

(a) Sampling

Take at random either 10% of the total number of wires, rounded upwards, or 10 wires, whichever is the lowest, from one core of each length of cable selected for the test.

(b) Method

Determine the diameter of each wire with a micrometer by taking a measurement in three positions, approx. 300mm far away from each other. The readings shall be made to two decimal places. Take the average of the three measurements to be the wire diameter.

2.1.4.2 Wires and tapes for concentric conductor or screen

(a) Sampling

A sample of about 500mm length is taken from the test piece and straightened by means of a non-damaging tool. After that it is cleaned.

(b) Procedure

For wires and tapes the diameter or the thickness is measured with an screw type micrometer or a dial gauge with a measuring element with flat measurement planes with a diameter 4mm to 8mm. Measurements shall be made at three points which are uniformly spread along the sample.

(c) Expression of results

The diameter or the thickness is the mean value obtained from the three measurements. The test is considered to be fulfilled if the mean value does not fall below the minimum value prescribed in the particular specification.

2.1.4.3 Wires, strips and tapes for armour

(a) Round wires

Take at random 10% of the total number of wires from a sample of completed cable. Determine the diameter of each wire of this sampling by using a micrometer with flat noses and taking two measurements at right angles to each other. Take the average value as the wire diameter.

(b) Flat wires or strips

Take at random 10% of the total number of flat wires or strips from a sample of completed cable. Determine the thickness and width of each flat wire by using a micrometer or vernier calliper with flat noses. Take the average values as the wire thickness and width respectively.

(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 by using a micrometer or vernier calliper with flat noses. Take the smallest value to be compared with the specified thickness with a tolerance given in the particular specification.

2.1.5 Measurement of thickness of metallic sheath

The thickness of lead sheaths shall be determined by one of the following methods, at the discretion of the manufacturer. (Methods of measuring thickness of other types of metallic sheath are under consideration.)

- (a) Strip method. The measurement shall be made on a test piece of sheath about 50mm in length removed from the finished cable length. The test piece shall be taken a sufficient distance from the cable end to allow a proper measurement to be made.

The piece shall be slit longitudinally and carefully flattened. After cleaning the test piece, a number of measurements shall be taken along the circumference of the sheath and not less than 10mm away from the edge of the flattened piece to ensure that the minimum thickness is measured. The measurement shall be made with a micrometer with plane faces of 4mm to 8mm diameter and an accuracy of ± 0.01 mm.

- (b) Ring method. The measurements shall be made on a ring of the sheath carefully cut from the sample. The thickness shall be determined at a sufficient number of points around the circumference of the ring to ensure that the minimum thickness is measured.

The measurements shall be made with a micrometer having either one flat nose and one ball nose, or one flat nose and a flat rectangular nose 0.8mm wide and 2.4mm long. The ball nose or the flat rectangular nose shall be applied to the inside of the ring. The accuracy of the micrometer shall be ± 0.01 mm.

2.1.6 Check of application of screen or armour tapes, or wires

2.1.6.1 Method 1

Take a cable sample 300mm long, at not less than 150mm from the end of a factory length. Measure the gap between adjacent edges of the tape(s), and also the tape width. Measurement is made at 4 positions along the sample, with an accuracy better than 0.5mm.