



SLOVENSKI STANDARD
SIST HD 21.2 S3:1998/A1:2003
01-februar-2003

Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation - Part 2: Test methods

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Starkstromleitungen mit thermoplastischer Isolierhülle für Nennspannungen bis 450/750 V -
- Teil 2: Prüfverfahren

Conducteurs et câbles isolés avec des matériaux thermoplastiques de tension assignée au plus élevée 450/750 V -- Partie 2: Méthodes d'essai

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Ta slovenski standard je istoveten z: HD 21.2 S3:1997/A1:2002

ICS:

29.060.20 Kabli Cables

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English version

**Cables of rated voltages up to and including 450/750 V
and having thermoplastic insulation
Part 2: Test methods**

Conducteurs et câbles isolés
avec des matériaux thermoplastiques
de tension assignée au plus égale
à 450/750 V
Partie 2: Méthodes d'essai

Starkstromleitungen mit thermoplastischer
Isolierhülle für Nennspannungen
bis 450/750 V
Teil 2: Prüfverfahren

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This amendment A1 modifies the Harmonization Document HD 21.2 S3:1997; it was approved by CENELEC on 2002-09-01. 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

Foreword

This amendment to the Harmonization Document HD 21.2 S3:1997 was prepared by the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to HD 21.2 S3:1997 on 2002-09-01.

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 2003-03-01
- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2003-09-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-09-01

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Title

Amend the title to read:

Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation - Part 2: Test methods

Subclause 1.1

Amend paragraph 1 to read:

HD 21 applies to rigid and flexible cables with insulation and sheath, if any, based on thermoplastic materials, of rated voltages U_0/U up to and including 450/750 V used in power installations.

In paragraph 2, line 2:

Delete "HD 405.1 and EN 60811" *and insert* "the common test methods for cables given in EN 50265, EN 50267, EN 50268 and EN 60811."

Subclause 2.2

Delete the second paragraph and insert the following:

"A voltage shall be applied between conductor(s) and groups of conductors in such a way that the insulation on each core is tested against all adjacent cores. The voltage shall be increased gradually to the specified value on each occasion."

Delete the fourth paragraph and insert the following:

A voltage shall be applied between conductor(s) and groups of conductors in such a way that the insulation on each core is tested against all adjacent cores and the metallic layer. The voltage shall be increased gradually to the specified value on each occasion."

Subclause 2.3

Amend the start of paragraph 3 to read:

In the case of flat non-sheathed cord, and unless otherwise indicated in the particular specification, a short cut

Subclause 2.5

In paragraph 1, at the end of the third sentence, add:

unless specified in the particular specification.

Subclause 2.8

Add new subclause as follows:

2.8 Surface resistance of sheath

When specified in the particular part of HD 21 this test shall be carried out on cables with sheaths. It shall be carried out on three samples of complete cable, each about 250 mm in length.

The sheath of each of the samples shall be cleaned with spirit, and two electrodes consisting of wire helices applied at a distance of (100 ± 2) mm from each other. For the helices, copper wire of between 0,2 mm and 0,6 mm diameter shall be used. After the wire has been applied, the surface of the sheath shall again be thoroughly cleaned between the electrodes.

The samples shall then be conditioned at a temperature of (20 ± 2) °C, and a relative humidity of (65 ± 5) %, for 24 hours.

Immediately after removal from the conditioning chamber, a d.c. voltage of between 100 V and 500 V shall be applied between the wire electrodes, and the resistance measured one minute after application of the voltage.

The measured resistance for each sample in ohms shall be multiplied by $\frac{a}{100}$, where a is the circumference of the sheath of the sample in mm. The median of the three values so obtained is recorded as the surface resistance of the sheath, and shall not be lower than 109 ohms.

Subclause 4.1

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In line 2:

Delete “HD 405.1” and insert “EN 50265-2-1”.

Subclause 4.1 (iii)

In line 1:

Delete “as described in clause 6 of HD 405.1” and insert “as referenced in 4.2 of EN 50265-2-1”.

Clauses 5 and 6

Insert:

(Spare)

Clause 7

Add new clause as follows:

7 Ozone resistance test

Warning: Attention is drawn to the toxicity of ozone.

Precautions should be taken to minimise exposure of personnel to it at all times and the concentration in the workroom environment should not be allowed to exceed 0,00001 % (0,1 parts ozone per million parts air by volume), or the value in the current industrial hygiene standard, whichever is the lower.

7.1 General

The test methods given hereafter are intended to check the ozone resistance of insulating and sheathing materials of electric cables.

7.2 Methods of test

The ozone resistance test shall be carried out according to one of the following methods, as required in the particular cable standard:

- A. According to EN 60811-2-1, clause 8
- B. According to 7.3 of this HD

7.3 Method B

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7.3.1 Test apparatus and testing devices

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7.3.1.1 Suitable ozone test chamber with uniform ozone concentration.

7.3.1.2 Cutting device for preparation of test strips.

7.3.1.3 Clamping device according to Figure 8 or a similar device.

7.3.1.4 Cylindrical mandrels consisting of wood or metal.

7.3.1.5 Desiccator filled with silica gel or an equivalent material.

7.3.2 Selection and cutting of test pieces

Three test pieces of at least 200 mm length consisting of the complete core or cable shall be used whenever possible under the proviso however that any coverings over the insulation or the sheath to be tested have been removed, care being taken not to damage the insulation or the sheath. If it is impossible to use the complete core or cable, the insulation or sheath respectively shall be cut longitudinally and the required three test strips of at least 5 mm but not more than 10 mm width shall be punched by using the cutting device according to 7.3.1.2. The test pieces shall be ground or cut, so as to obtain test pieces of uniform thickness, care being taken to avoid undue heating. After grinding or cutting the thickness of pieces shall be not less than 0,8 mm and not more than 2,0 mm.

7.3.3 Conditioning and preparation of test pieces

The test pieces shall be wiped with a clean cloth to remove dirt or moisture and stored in the desiccator according to 7.3.1.5 for at least 16 h.

7.3.3.1 Test pieces consisting of the complete core or cable shall be wound around the mandrel according to 7.3.1.4. The diameter of the mandrel shall be $(2 \pm 0,1) D$ (D: outer diameter of test piece). Both ends of the pieces shall be fixed on the mandrel in order to keep the windings in position.

7.3.3.2 Test strips shall be clamped on both ends in the clamping device according to 7.3.1.3 in such a way as to obtain a free length between the clamps of 100 mm. Subsequently the test pieces shall be elongated by $(33 \pm 2) \%$.

NOTE To avoid possible ozone cracks near the clamps the test pieces may be covered locally by a suitable resistant lacquer.

7.3.4 Test procedure

The required number of test pieces prepared according to 7.3.3 shall be placed substantially in the middle of the test chamber according to 7.3.1.1 so that each piece is at least 20 mm from any other piece and exposed to the ozone concentration required.

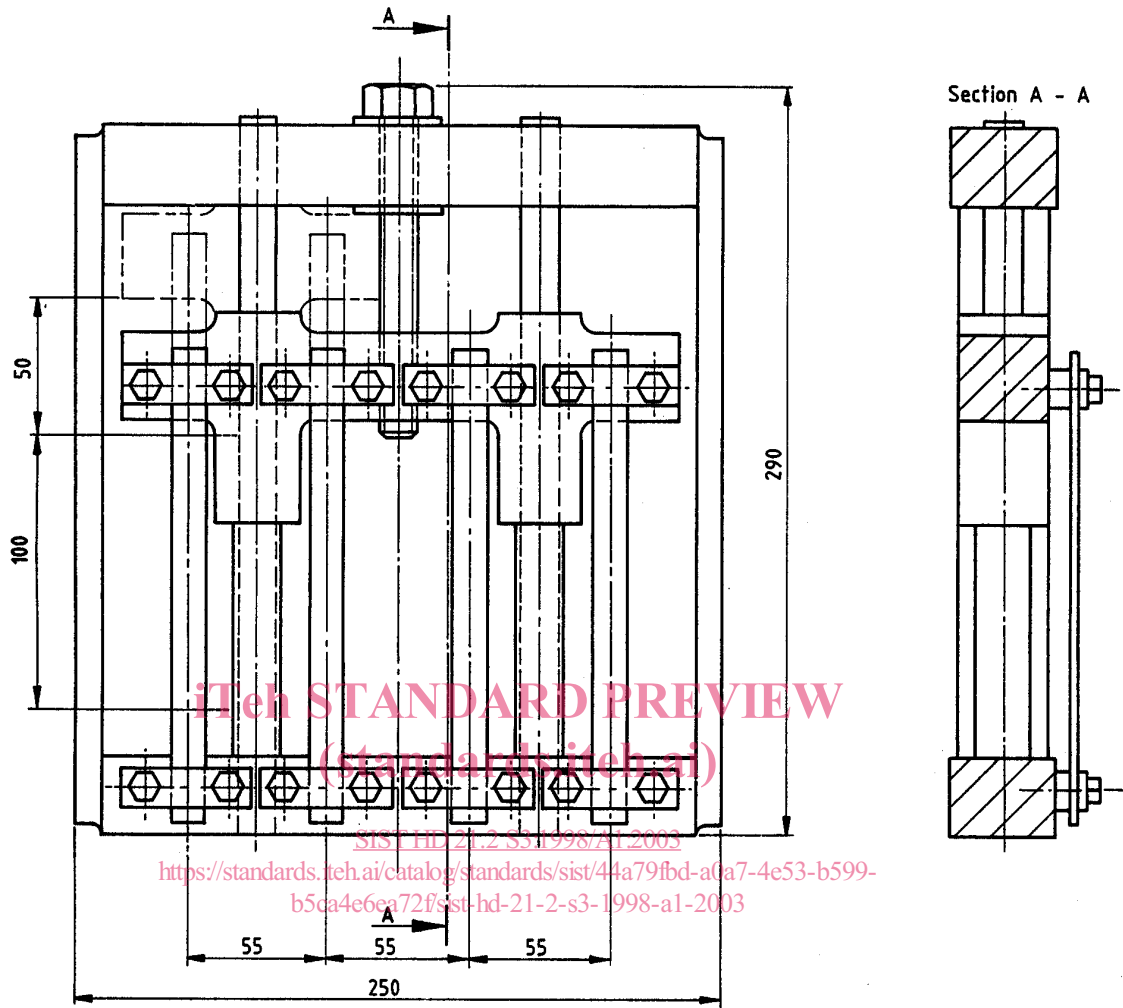
The ozone concentration shall be measured inside the test chamber and the other test conditions shall comply with the appropriate values for method B in Part 1 of this HD.

The air with the required ozone concentration shall have a flow rate from 0,2 up to 0,5 times the chamber content per minute. To avoid laminar flow along the samples the speed shall be ≥ 500 mm/s. This can be achieved by a built-in fan and can be checked by an anemometer.

7.3.5 Requirements

After the specified test duration the test pieces shall be removed from the test chamber, and while still elongated, shall show no cracks when examined with normal or corrected vision.

Any cracks near the fixing point on the mandrel and/or near the clamps when using test strips shall be disregarded.



All dimensions are in millimetres.

Figure 8 - Example of a clamping device