

SLOVENSKI
STANDARD

SIST HD 22.10
S1:1998/A1:1999

prva izdaja
november 1999

Rubber insulated cables of rated voltages up to and including 450/750 V – Part 10:
EPR insulated and polyurethane sheathed flexible cables - Amendment A1

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ICS 29.060.20

Referenčna številka
SIST HD 22.10 S1:1998/A1:1999(en)

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ICS 29.060.20
UDC 621.315.3.027.2:621.315.6-036.664

Descriptors: Electrical installation, insulated conductor, insulated cable, flexible cable, ethylene-propylene-rubber, protective sheath, polyurethane, particular specification, construction, dimension, test, marking

English version

**Rubber insulated cables of rated voltages up to and
including 450/750 V
Part 10: EPR insulated and polyurethane sheathed flexible cable**

Conducteurs et câbles isolés au
caoutchouc de tension assignée au
plus égale à 450/750 V
Partie 10: Câbles souples à isolation
EPR et gaine polyuréthane

Gummi-isolierte Leitungen mit
Nennspannungen bis 450/750 V
Teil 10: EPR-isolierte flexible
Starkstromleitungen mit
Polyurethanmantel

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This amendment A1 modifies the Harmonization Document HD 22.10 S1:1994; it was approved by CENELEC on 1998-08-01. 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, Netherlands, Norway, Portugal, 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 was prepared by the Technical Committee CENELEC TC20, Electric cables, and agreed at the Dublin meeting (April 1997) to go forward to the Unique Acceptance Procedure.

This amendment has been prepared within the regular maintenance programme which covers all Parts of HD 22.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to HD 22.10 S1:1994 on 1998-08-01 .

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 1998-12-01
- latest date by which the amendment has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 1999-06-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2000-06-01

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Amendment A1 to HD 22.10 S1

Clause 2

Amend "HD 505" to "EN 60811" and delete "(Endorsing IEC 811)".

Sub-clause 3.3.5

In paragraph 3, line 3, amend "HD 505.1.2" to "EN 60811-1-2".

Sub-clause 3.3.8

Amend the end of the sub-clause to read:

" Part 1, sub-clause 3.2"

Table II

Delete existing Table II and replace as attached.

Sub-clause 4.3.5

In paragraph 3, line 3, amend "HD 505.1.2" to "EN 60811-1-2".

Sub-clause 4.3.8

Amend the end of the sub-clause to read: [SIST HD 22.10 S1:1998/A1:1999
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" Part 1, Sub-clause 3.2"

Table III

Add to Table III the following types:

1	2	3	4	5
2 x 1	0,8	0,9	6,9	9,0
3 x 1	0,8	0,9	7,3	9,5
4 x 1	0,8	1,0	8,2	10,7
5 x 1	0,8	1,1	9,2	11,9

Table IV

Delete existing Table IV and replace as attached.

Table A.1

Delete existing Table A.1 and replace as attached.

Sub-clause A.2.1.1

In line 2 amend "HD 505.1.1" to "EN 60811-1-1"

Sub-clause A.2.1.2

At the end of paragraph 2 amend "HD 505.1.1" to "EN 60811-1-1".

Sub-clause A.2.3

Delete the whole of sub-clause A.2.3 and replace as follows:

A.2.3 Determination of the saponification value of the Polyurethane sheath

A.2.3.1 Scope

This test method applies to the determination of esterified acids content in polyurethane for indirect characterisation of resistance to microbes on the part of cables, wires and flexible cords.

Note: With rising ether content and falling ester content in polyurethane, resistance to microbes increases.

A.2.3.2 Definition

A.2.3.2.1 Saponification value

The quantity of potassium hydroxide, expressed in mg, and required for the saponification of 1g of the sample being examined.

A.2.3.2.2 Saponification

The formation of alkali salts, regardless of the form in which the corresponding acids occur.

A.2.3.3 Test equipment and materials

250ml flask with ground-in stopper, narrow necked with standard ground joint

Reflux condenser, standard ground joint

Burette

Accurate laboratory balance reading to 0,1mg

Electrically heated heating cabinet with natural air flow

Electrically heated water bath

Caustic potash solution, $c(\text{KOH}) = 0,5 \text{ mol/l}$, ethanolic

Hydrochloric acid solution, $c(\text{HCl}) = 0,5 \text{ mol/l}$

Phenolphthalein, 1% in ethanol

Tetrahydrofuran, stabilized with 2,6-Di-tert-butyl-4-methylphenol

Boiling stones or similar

Distilled or deionized water

A.2.3.4 General

EN 60811 applies, where nothing is specified in this standard to the contrary.

A.2.3.5 Preparation

From the test specimen a sample shall be taken, which is sufficient for at least two tests.

A.2.3.6 Procedure

Using the accurate laboratory balance approximately 0,5 g of finely granulated material are weighed into the 250 ml flask with ground-in stopper to the nearest 0,001 g (quantity *E*). After addition of 50 ml of Tetrahydrofuran, the flask is sealed with the ground-in stopper and placed in the heating cabinet at a temperature of 60°C until the sample has completely dissolved. Shaking of the flask from time to time can speed up the dissolving process. Then 25 ml of caustic potash solution shall be added from a burette along with some boiling stones. The sample is saponified for 3 hours in the water bath under reflux and at boiling temperature. Immediately afterwards and without cooling after addition of 50 ml of distilled water and three drops of phenolphthalein solution, back titration is performed with hydrochloric acid (consumption *a*). A blank test shall be carried out in the same way (consumption *b*). The test shall be carried out on at least two samples.

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A.2.3.7 Evaluation of test results

The saponification value of mg KOH/g shall be calculated according to the following numerical equation:

$$\text{saponification value} = \frac{(b-a) \cdot 28,05}{E}$$

Wherein:

a = consumption in ml of hydrochloric acid solution $c(\text{HCl}) = 0,5 \text{ mol/l}$ in titration of the sample

b = consumption in ml of hydrochloric acid solution $c(\text{HCl}) = 0,5 \text{ mol/l}$ in the blind test

E = weight in g

The test is deemed passed provided that the maximum specified in the standards for insulated cables and cords is not exceeded.

Table II

Tests for Type H05BQ-F

1	2	3	4	5
Ref. No.	Test	Category of test	Test Method described in	
			HD/EN	Clause
1.	<u>Electrical tests</u>			
1.1	Resistance of conductors	T, S	22.2	2.1
1.2	Voltage test at 1500V on cores	T	22.2	2.3
1.3	Voltage test on completed cable at 2000V	T, S	22.2	2.2
1.4	Absence of faults on insulation	R	22.2	2.6
1.5	Surface resistance of sheath	T	22.2	2.7
2.	<u>Provisions covering constructional and dimensional characteristics</u>			
2.1	Checking of compliance with constructional provisions	T, S	22.1	Inspection and manual tests
2.2	Measurement of thickness of insulation	T, S	22.2	1.9
2.3	Measurement of thickness of sheath	T, S	22.2	1.10
2.4	Measurement of overall diameter			
2.4.1	Mean value	T, S	22.2	1.11
2.4.2	Ovality	T, S	22.2	1.11
2.5	Solderability test (Plain conductors)	T	22.2	1.12
3.	<u>Mechanical properties of insulation</u>			
3.1	Tensile test before ageing	T	60811-1-1	9.1
3.2	Tensile test after ageing in the air oven	T	60811-1-2	8.1.3.2a
3.3	Tensile test after ageing in air bomb	T	60811-1-2	8.2
3.4	Hot set test	T	60811-2-1	9
4.	<u>Mechanical properties of sheath</u>			
4.1	Tensile test before ageing	T	60811-1-1	9.2
4.2	Tensile test after ageing in air oven	T	60811-1-2	8.1.3.1
4.3	Tensile test after immersion in oil	T	60811-2-1	10
4.4	Tensile test after immersion in water	T	22.10	Annex A.2.1
4.5	Tear resistance test	T	22.10	Annex A.2.2
5.	<u>Compatibility test</u>	T	60811-1-2	8.1.4
6.	<u>Ozone resistance test for insulation:</u> (either method may be used)			
	Method A	T	60811-2-1	8
	Method B	T	22.2	7.3

Table II
 (concluded)

1	2	3	4	5
Ref. No.	Test	Category of test	Test Method described in	
			HD/EN	Clause
7.	<u>Pressure test at high temperature for sheath</u>	T	60811-3-1	8.2
8.	<u>Heat shock test for sheath</u>	T	60811-3-1	9.2
9.	<u>Tests at low temperature</u>			
9.1	Bending test			
9.1.1	Insulation	T	60811-1-4	8.1
9.1.2	Sheath	T	60811-1-4	8.2
9.2	Impact test for sheath	T	60811-1-4	8.5
10.	<u>Saponification test for sheath</u>	T	22.10	Annex A.2.3
11.	<u>Mechanical strength of completed cable</u>			
11.1	Flexing test followed, after removal of the sheath, by a voltage test at 1500V on cores immersed in water	T	22.2	3.1 and 2.3

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