



SLOVENSKI STANDARD
SIST HD 22.10 S1:1998

01-februar-1998

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

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

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

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

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HARMONIZATION DOCUMENT

HD 22.10 S1

DOCUMENT D'HARMONISATION

HARMONISIERUNGSDOKUMENT

October 1994

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Descriptors: Electrical installation, insulated conductor, insulated cable, flexible cable, ethylen-propylen-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
Dixième partie: Câbles
souples à isolation EPR et gaine
polyuréthane

Isolierte Starkstromleitungen
mit einer Isolierung aus Gummi
mit Nennspannungen bis 450/750 V
Teil 10: EPR isolierte
flexible Starkstromleitung mit
Polyurethanmantel

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This Harmonization Document was approved by CENELEC on 1994-05-15.
CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

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

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, 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

HD22 was originally adopted by CENELEC on 9th July 1975.

Edition 2 of HD22 was implemented on 1st January 1984, and at that time contained four parts.

Since 1984, new parts have been published, original parts amended, and in addition HD 505 has superseded HD 385 as the cross-reference for test methods.

This new Part 10 to HD22 introduces flexible cables with EPR insulation and thermoplastic polyurethane sheath.

HD22 now has the following parts: (* = new edition or new publication available shortly)

- HD22.1 S2 - General requirements (with AM1 to AM10)
- HD22.2 S2 - Test methods (with AM1 to AM4 inclusive)
- HD22.3 S3* - Heat resistant silicone rubber insulated cables
- HD22.4 S3* - Cords and flexible cables
- HD22.5 - (Spare)
- HD22.6 S2* - Arc welding cables
- HD22.7 S2* - Cables with increased heat resistance for internal wiring for a conductor temperature of 110°C
- HD22.8 S2 - Polychloroprene or equivalent synthetic elastomer sheathed cable for use as decorative chains
- HD 22.9 S2* - Single core non-sheathed cables for fixed wiring having low emission of smoke and corrosive gases
- HD 22.10 S1 - EPR insulated and polyurethane sheathed flexible cables
- HD 22.11 S1* - EVA cords and flexible cables
- HD 22.12 S1* - Heat resistant EPR cords and flexible cables
- HD 22.13 S1* - Single and multicore flexible cables, insulated and sheathed with crosslinked compound and having low emission of smoke and corrosive gases
- HD 22.14 S1* - Cords for applications requiring high flexibility

This draft was submitted to the CENELEC Formal Vote in December 1993 and was approved by CENELEC as HD 22.10 S1 on 1994-07-05.

The following dates were fixed:

- latest date of announcement
of the HD at national level (doa) 1995-01-15
- latest date of publication of a
harmonised national standard (dop) 1995-07-15
- latest date of withdrawal of
conflicting national standards (dow) 1995-07-15

For products which have complied with the equivalent National standards before 1995-07-15, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1996-07-15.

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RUBBER INSULATED CABLES OF RATED VOLTAGES
UP TO AND INCLUDING 450/750V

PART 10 : EPR INSULATED AND POLYURETHANE SHEATHED FLEXIBLE CABLE

1. SCOPE

This Part 10 of the HD details the particular requirements for ethylene-propylene rubber insulated, and thermoplastic polyurethane sheathed cable for a maximum conductor temperature of 90°C and lowest handling temperature of -40°C.

Each cable shall comply with the appropriate requirements given in Part 1 of this HD and the particular requirements of this Part.

NOTE 1: The sheath specified in this Part of HD 22 is unvulcanised. The requirements and special additional test methods are therefore included as Annex A to this Part.

NOTE 2: The overall dimensions of the cables in this Part of HD 22 have been calculated in accordance with EN 60719.

2. Normative references

HD 22.10 incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to HD 22.10 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

HD 383 Conductors of insulated cables (Endorsing IEC 228 and 228A)

HD 505 Common test methods for insulating and sheathing materials of Electric Cables (Endorsing IEC 811)

EN 60719 Calculation of the lower and upper limits for the average outer dimensions of cables with circular copper conductors and of rated voltages up to and including 450/750V

3. EPR INSULATED AND POLYURETHANE SHEATHED FLEXIBLE CABLE (300/500V)

3.1 Code designation

H05BQ-F

3.2 Rated voltage

300/500V

3.3 Construction

3.3.1 Conductor

Number of conductors: 2, 3, 4 or 5.

The conductors shall be in accordance with the requirements given in HD 383 for Class 5 conductors. The wires may be plain or tinned.

3.3.2 Separator

A separator of suitable material may be applied around each conductor.

3.3.3 Insulation

The insulation shall be rubber compound of Type EI 6 applied around each conductor.

The insulation shall be applied by extrusion.

The insulation thickness shall comply with the specified value given in Part 10, Table I, column 2.

3.3.4 Assembly of cores and filler, if any

The cores shall be twisted together.

A centre filler may be used.

3.3.5 Inner covering

The twisted cores may be covered by either:

- an extruded inner covering of an unvulcanised rubber or plastic compound;
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- a separating tape of suitable material, which may be combined with separate fillers.

Alternatively the sheath may fill the spaces between cores.

There shall be no harmful interactions between the inner covering and the insulation and/or the sheath at the operating temperature. Compliance with this requirement shall be checked by the test given in sub-clause 8.1.4 of HD 505.1.2.

The extruded inner covering, or alternatively the sheath, shall surround the twisted cores and penetrate the spaces between them, giving the assembly a practically circular shape. The extruded inner covering shall not adhere to the cores.

The approximate value of thickness of the extruded inner covering is 0.3mm. No thickness measurement is required.

3.3.6 Sheath

The sheath shall be thermoplastic polyurethane of Type TPU (see Annex A) applied around the inner covering.

The thickness of sheath shall comply with the specified value given in Table I, column 3 of this Part.

The sheath shall be extruded in a single layer and fit closely but not adhere to the inner covering, or, where there is no separate inner covering, shall not adhere to the cores.

3.3.7 Overall diameter

The mean overall diameter shall be within the limits given in Table I, columns 4 and 5 of this Part.

3.3.8 Outer marking

To distinguish the cords and cables from types having cross-linked rubber sheaths, at least the mandatory marking BQ shall be printed or embossed on, or indented into the sheath.

The marking shall be continuous, in accordance with Part 1, sub-clause 3.1.1.

3.4 Tests

Compliance with the requirements of Part 10 sub-clause 3.3 shall be checked by inspection and by the tests given in Table II of this Part.

3.5 Guide to use (Informative)

See HD 516

TABLE I

Dimensions of Type H05BQ-F

1	2	3	4	5
Number and nominal cross-sectional area of conductors	Thickness of insulation Specified value	Thickness of sheath Specified value	Mean overall diameter	
			Lower limit	Upper Limit
(mm ²)	(mm)	(mm)	(mm)	(mm)
2 x 0.75	0.6	0.8	5.7	7.4
2 x 1	0.6	0.9	6.1	8.0
3 x 0.75	0.6	0.9	6.2	8.1
3 x 1	0.6	0.9	6.5	8.5
4 x 0.75	0.6	0.9	6.8	8.8
4 x 1	0.6	0.9	7.1	9.3
5 x 0.75	0.6	1.0	7.6	9.9
5 x 1	0.6	1.0	8.0	10.3

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TABLE II
TESTS FOR TYPE H05BQ-F

1	2	3	4	5
Ref. No.	Test	Category of test	Test Method described in	
			HD	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 (Untinned conductors)	T	22.2	1.12
3.	<u>Mechanical properties of insulation</u>			
3.1	Tensile test before ageing	T	505.1.1	9.1
3.2	Tensile test after ageing in the air oven	T	505.1.2	8.1.3.2a
3.3	Hot set test	T	505.2.1	9
4.	<u>Mechanical properties of sheath</u>			
4.1	Tensile test before ageing	T	505.1.1	9.2
4.2	Tensile test after ageing in air oven	T	505.1.2	8.1.3.1
4.3	Tensile test after immersion in oil	T	505.2.1	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	505.1.2	8.1.4
6.	<u>Ozone resistance test for insulation:</u> (either method may be used)			
	Method A	T	505.2.1	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	Clause
7.	<u>Pressure test at high temperature for sheath</u>	T	505.3.1	8.2
8.	<u>Heat shock test for sheath</u>	T	505.3.1	9.2
9.	<u>Tests at low temperature</u>			
9.1	Bending test			
9.1.1	Insulation	T	505.1.4	8.1
9.1.2	Sheath	T	505.1.4	8.2
9.2	Impact test for sheath	T	505.1.4	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