

SLOVENSKI STANDARD

SIST HD 21.13 S1:1998

01-februar-1998

Kabli s polivinilkloridno izolacijo za naznačene napetosti do vključno 450/750 V - 13. del: Kabli z dvema ali več vodniki, s polivinilkloridnim plaščem, odpornim proti olju

Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 13: Oil resistant PVC sheathed cables with two or more conductors

Polyvinylchlorid-isolierte Leitungen mit Nennspannungen bis 450/750 V - Teil 13: Ölbeständige PVC-Steuerleitungen mit zwei oder mehr Adern

Conducteurs et câbles isolés au polychlorure de vinyle, de tension assignée au plus égale à 450/750 V - Partie 13: Câbles souples avec gaine de polychlorure de vinyle, résistant à l'huile, à deux âmes ou plus

Ta slovenski standard je istoveten z: HD 21.13 S1:1995

ICS:

29.060.20 Kabli Cables

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 21.13 S1

September 1995

ICS 29.060.20

Descriptors: Insulated conductor, insulated cable, flexible cable, insulation, protective sheath, polyvinyl chloride, specification, dimension, test

English version

**Polyvinyl chloride insulated cables of rated voltages up to
and including 450/750 V
Part 13: Oil resistant PVC sheathed cables with two or
more conductors**

Conducteurs et câbles isolés au
polychlorure de vinyle, de tension
assignée au plus égale à 450/750 V
Partie 13: Câbles souples avec gaine de
polychlorure de vinyle, résistant à
l'huile, à deux âmes ou plus

Polyvinylchlorid-isolierte Leitungen mit
Nennspannungen bis 450/750 V
Teil 13: Ölbeständige
PVC-Steuerleitungen mit zwei oder mehr
Adern

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This Harmonization Document was approved by CENELEC on 1995-07-04. 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 such 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

HD 21 was originally adopted by CENELEC on 9th July 1975.

Edition 2 of HD 21 was implemented on 1st January 1984, and at that time contained five 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 13 to HD 21 introduces oil-resistant PVC sheathed cables, and was approved by TC 20 at its London meeting in October 1993 to go forward to UAP.

HD 21 now has the following parts:

- | | | |
|-------------|---|--|
| HD 21.1 S2 | - | General requirements (with A1 to A4 inclusive) |
| HD 21.2 S2 | - | Test methods (with A1 inclusive) |
| HD 21.3 S3 | - | Non-sheathed cables for fixed wiring |
| HD 21.4 S2 | - | Sheathed cables for fixed wiring (Reprint) |
| HD 21.5 S3 | - | Flexible cables (cords) |
| HD 21.6 | - | (Spare) |
| HD 21.7 S2 | - | Single core non-sheathed cables for internal wiring for a conductor temperature of 90 °C |
| HD 21.8 S1 | - | Single core non-sheathed cables for decorative chains (with A1 inclusive) |
| HD 21.9 S2 | - | Single core non-sheathed cables for installation at low temperatures |
| HD 21.10 S1 | - | Extensible leads |
| HD 21.11 S1 | - | Cables for luminaires |
| HD 21.12 S1 | - | Heat-resistant flexible cables (cords) |
| HD 21.13 S1 | - | Oil resistant PVC sheathed cables with two or more conductors |

This Harmonization Document 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 HD 21.13 S1 on 1995-07-04.

The following dates were fixed:

- | | |
|--|------------------|
| - latest date by which the existence of the HD has to be announced at national level | (doa) 1996-01-01 |
| - latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement | (dop) 1996-07-01 |
| - latest date by which the national standards conflicting with the HD have to be withdrawn | (dow) 1996-07-01 |

For products which have complied with the relevant national standard before 1996-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-07-01.

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1. Scope

This part (part 13) of the HD details the particular specifications for oil resistant polyvinyl chloride insulated and sheathed flexible cables, of rated voltage (U_0/U) up to and including 300/500V, for a maximum conductor temperature in normal operation of 70°C.

All cables shall comply with the appropriate requirements given in Part 1 and the individual types of cable shall comply with the particular requirements of this Part.

NOTE: The limits for the overall diameter of the cables have been calculated in accordance with EN 60719.

2. Normative references

HD 21.13 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 21.13 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- HD 186 Marking by inscription for the identification of cores of electric cables having more than five cores
- HD 383 Conductors of insulated cables (Endorsing IEC 228 and 228A)
- HD 405.1 Tests on electric cables under fire conditions. Part 1: Test on a single vertical cable (Endorsing IEC 332-1)
- 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
- IEC 502 Extruded solid dielectric insulated power cables for rated voltages from 1kV up to 30kV

3. Oil resistant polyvinyl chloride sheathed, unscreened cables with two or more conductors

3.1 Code designation

H05VV5-F

3.2 Rated voltage

300/500V

3.3 Construction

3.3.1 Conductor

Number of conductors: 2 to 60

Preferred number of conductors: 2, 3, 4, 5, 6, 7, 12, 18, 27, 36, 48 and 60.

The conductors shall comply with the requirements given in HD 383 for class 5 conductors.

3.3.2 Insulation

The insulation shall be polyvinyl chloride compound of Type TI 2 applied around each conductor.

The insulation thickness shall comply with the specified value given in Table 1, column 2 of this part.

The insulation resistance shall not be less than the value given in Table 1, column 6 of this part.

3.3.3 Assembly of cores and fillers, if any

The cores shall be twisted together, if necessary in several concentric layers.

A centre-core is not permitted but a centre-filler of suitable material may be applied.

Assemblies with three or more cores shall have one core coloured green/yellow.

Around each layer a tape may be applied which may cover the cores fully or partly. The tape shall not adhere to the cores.

For two core cables, the space between the cores shall be filled either by separate fillers or by the sheath filling the interstices.

3.3.4 Sheath

The sheath shall be polyvinyl chloride compound of type TM 5 applied around the core assembly.

For cables with the preferred number of cores, the thickness of the sheath shall comply with the specified value given in Table 1, column 3 of this part.

For other cables, the thickness of the sheath shall be calculated by the formula : $t = 0.08 D + 0.4 \text{ mm}$ with a maximum value of 2.4 mm.

D is the fictitious diameter over the core assembly.

The fictitious diameter shall be calculated in accordance with IEC 502, Appendix A.

The sheath may fill the spaces between the cores, thus forming a filling but it shall not adhere to the cores.

The cable shall have a practically circular cross-section.

3.3.5 Core identification

Except for the green/yellow core, if any, all cores shall be identified by number in accordance with HD 186, using black as base and white as inscription.

3.3.6 Overall diameter

The mean overall diameter of the cables with the preferred number of cores shall be within the limits given in Table 1, columns 4 and 5 of this part.

3.4 Tests

Compliance with the requirements of sub-clause 3.3 shall be checked by inspection and by tests given in Table 2 of this part.

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3.5 Guide to use (informative)

See HD 516

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Table 1 - General data for H05VV5-F

1	2	3	4	5	6
Number and nominal cross-sectional area of conductors mm ²	Insulation thickness	Sheath thickness	Mean overall diameter		Minimum insulation resistance at 70°C MΩ.km
	Specified value mm	Specified value mm	Lower Limit mm	Upper Limit mm	
2 x 0.5	0.6	0.7	5.2	6.6	0.013
2 x 0.75	0.6	0.8	5.7	7.2	0.011
2 x 1	0.6	0.8	5.9	7.5	0.010
2 x 1.5	0.7	0.8	6.8	8.6	0.010
2 x 2.5	0.8	0.9	8.2	10.3	0.009
3 x 0.5	0.6	0.7	5.5	7.0	0.013
3 x 0.75	0.6	0.8	6.0	7.6	0.011
3 x 1	0.6	0.8	6.3	8.0	0.010
3 x 1.5	0.7	0.9	7.4	9.4	0.010
3 x 2.5	0.8	1.0	9.0	11.2	0.009
4 x 0.5	0.6	0.8	6.2	7.9	0.013
4 x 0.75	0.6	0.8	6.6	8.3	0.011
4 x 1	0.6	0.8	6.9	8.7	0.010
4 x 1.5	0.7	0.9	8.2	10.2	0.010
4 x 2.5	0.8	1.1	10.1	12.5	0.009
5 x 0.5	0.6	0.8	6.8	8.6	0.013
5 x 0.75	0.6	0.9	7.4	9.3	0.011
5 x 1	0.6	0.9	7.8	9.8	0.010
5 x 1.5	0.7	1.0	9.1	11.4	0.010
5 x 2.5	0.8	1.1	11.0	13.7	0.009
6 x 0.5	0.6	0.9	7.6	9.6	0.013
6 x 0.75	0.6	0.9	8.1	10.1	0.011
6 x 1	0.6	1.0	8.7	10.8	0.010
6 x 1.5	0.7	1.1	10.2	12.6	0.010
6 x 2.5	0.8	1.2	12.2	15.1	0.009
7 x 0.5	0.6	0.9	8.3	10.4	0.013
7 x 0.75	0.6	1.0	9.0	11.3	0.011
7 x 1	0.6	1.0	9.5	11.8	0.010
7 x 1.5	0.7	1.2	11.3	14.1	0.010
7 x 2.5	0.8	1.3	13.6	16.8	0.009
12 x 0.5	0.6	1.1	10.4	12.9	0.013
12 x 0.75	0.6	1.1	11.0	13.7	0.011
12 x 1	0.6	1.2	11.8	14.6	0.010
12 x 1.5	0.7	1.3	13.8	17.0	0.010
12 x 2.5	0.8	1.5	16.8	20.6	0.009
18 x 0.5	0.6	1.2	12.3	15.3	0.013
18 x 0.75	0.6	1.3	13.2	16.4	0.011
18 x 1	0.6	1.3	14.0	17.2	0.010
18 x 1.5	0.7	1.5	16.5	20.3	0.010
18 x 2.5	0.8	1.8	20.2	24.8	0.009

Table 1 (concluded)

1	2	3	4	5	6
Number and nominal cross-sectional area of conductors mm ²	Insulation thickness	Sheath thickness	Mean overall diameter		Minimum insulation resistance at 70°C MΩ.km
	Specified value mm	Specified value mm	Lower Limit mm	Upper Limit mm	
27 x 0.5	0.6	1.4	15.1	18.6	0.013
27 x 0.75	0.6	1.5	16.2	19.9	0.011
27 x 1	0.6	1.5	17.0	21.0	0.010
27 x 1.5	0.7	1.8	20.3	24.9	0.010
27 x 2.5	0.8	2.1	24.7	30.2	0.009
36 x 0.5	0.6	1.5	17.0	20.9	0.013
36 x 0.75	0.6	1.6	18.2	22.4	0.011
36 x 1	0.6	1.7	19.4	23.8	0.010
36 x 1.5	0.7	2.0	23.0	28.2	0.010
36 x 2.5	0.8	2.3	28.0	34.2	0.009
48 x 0.5	0.6	1.7	19.8	24.3	0.013
48 x 0.75	0.6	1.8	21.2	25.9	0.011
48 x 1	0.6	1.9	22.5	27.6	0.010
48 x 1.5	0.7	2.2	26.6	32.5	0.010
48 x 2.5	0.8	2.4	32.1	39.1	0.009
60 x 0.5	0.6	1.8	21.7	26.6	0.013
60 x 0.75	0.6	2.0	23.4	28.7	0.011
60 x 1	0.6	2.1	24.9	30.5	0.010
60 x 1.5	0.7	2.4	29.4	35.8	0.010
60 x 2.5	0.8	2.4	35.0	42.6	0.009

Table 2 - Tests for H05VV5-F

1	2	3	4	5
Ref. No.	Tests	Category of test	Described in	
			HD	Clause
1.	<u>Electrical Tests</u>			
1.1	Resistance of conductors	T, S	21.2	2.1
1.2	Voltage test on cores according to specified insulation thickness			
1.2.1	at 1500 V up to and including 0.6mm	T	21.2	2.3
1.2.2	at 2000 V exceeding 0.6mm	T	21.2	2.3
1.3	Voltage test on completed cable at 2000 V	T, S	21.2	2.2
1.4	Insulation resistance at 70°C	T	21.2	2.4
1.5	Absence of faults on insulation	R	21.2	2.6
2.	<u>Provisions covering constructional and dimensional characteristics</u>			
2.1	Checking of compliance with constructional provisions	T, S	21.1	Inspection and manual tests
2.2	Measurements of insulation thickness	T, S	21.2	1.9
2.3	Measurements of thickness of sheath	T, S	21.2	1.10
2.4	Measurement of overall diameter			
2.4.1	mean value	T, S	21.2	1.11
2.4.2	ovality	T, S	21.2	1.11
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	T	505.1.2	8.1.3.1
3.3	Loss of mass test	T	505.3.2	8.1
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	T	505.1.2	8.1.3.1
4.3	Loss of mass test	T	505.3.2	8.2
5.	<u>Compatibility test</u>	T	505.1.2	8.1.4