



SLOVENSKI STANDARD

SIST HD 620 S1:1998

01-februar-1998

Distribucijski kabli z ekstrudirano izolacijo za naznačene napetosti od 3,6/6 (7,2) kV do 20,8/36 (42) kV

Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV

Energieverteilungskabel mit extrudierter Isolierung für Nennspannungen von 3,6/6 (7,2) kV bis 20,8/36 (42) kV

Câbles de distribution, à isolation extrudée, pour des tensions assignées de 3,6/6 (7,2) kV à 20,8/36 (42) kV inclus

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Ta slovenski standard je istoveten z: HD 620 S1:1996

ICS:

29.060.20 Kabli Cables

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 620 S1
(Volume I: Parts 1 to 5)
June 1996

ICS 29.060.20

Descriptors: Electric cable, insulated cable, polyvinyl chloride, polyethylene, designation, composition, dimension, construction characteristics, mechanical characteristics, test, marking

English version

Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV

Câbles de distribution, à isolation
extrudée, pour des tensions assignées
de 3,6/6 (7,2) kV à 20,8/36 (42) kV
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Energieverteilungskabel mit extrudierter
Isolierung für Nennspannungen von
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This Harmonization Document was approved by CENELEC on 1995-11-28. 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

This Harmonisation Document was prepared by WG9 of CENELEC Technical Committee TC20, Electric Cables. It was agreed by TC20 at its Helsinki meeting (May 1994) to be submitted for formal vote by National Committees.

The document contains the following Parts, arranged according to the main constructional features of the cables covered:

- Part 1 - General requirements
- Part 3 - PVC insulated single core cables
- Part 4 - PVC insulated three core cables
- Part 5 - XLPE insulated single core cables, and single core pre-assembled cables
- Part 6 - XLPE insulated three core cables
- Part 7 - EPR insulated single core cables and single core pre-assembled cables
- Part 8 - EPR insulated three core cables
- Part 9 - HEPR insulated single core cables, and single core pre-assembled cables

There is no Part 2, which was to have covered Additional Test Methods. These have been combined with the corresponding Part from HD 622 (Power cables having rated voltage from 3.6/6(7.2)kV up to and including 20.8/36(42)kV with special fire performance for use in power stations) to form Amendment No. 1 to HD 605.

Each of Parts 3-9 inclusive are further divided into particular sections and, by decision of the Technical Board (D68/O47) National Committees need at present only implement in their national language those sections having national applicability. The obligation remains however to announce the full HD in public by titles and numbers, and also to withdraw any conflicting national standards.

Page numbering reflects the arrangement into Parts and particular sections, e.g. Page 4-C-3 is page 3 of particular section C of Part 4.

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References to other HDs, ENs and international standards are given in the particular parts or sections.

The draft was submitted to the formal vote and was approved by CENELEC as HD 620 S1 on 1995-11-28.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 1996-06-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 1996-12-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 1996-12-01

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HD 620 S1:1996

DISTRIBUTION CABLES WITH EXTRUDED
INSULATION FOR RATED VOLTAGES FROM
3.6/6 (7.2) kV UP TO AND INCLUDING
20.8/36 (42) kV

PART 1 - GENERAL REQUIREMENTS

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REFERENCES

Part 1 of HD 620 S1 incorporates by dated or undated reference, provisions from other publications. These 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 Part 1 of HD 620 S1 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| | |
|----------|---|
| EN 60811 | Common test methods for insulating and sheathing materials of electric cables |
| HD 383 | Conductors of insulated cables (Endorsing IEC 228 and 228A) |
| HD 405 | Tests on electric cables under fire conditions |
| HD 605 | Electric cables: Additional test methods |
| IEC 229 | Tests on cable oversheaths which have a special protective function and are applied by extrusion |
| IEC 287 | Calculation of the continuous current rating of cables (100% load factor) |
| IEC 840 | Tests for power cables with extruded insulation for rated voltages above 30kV ($U_m = 36$ kV) up to 150 kV ($U_m = 170$ kV) |
| IEC 885 | Electrical test methods for electric cables |

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1. General

1.1 Scope

HD 620 applies to cables with extruded insulation and for rated voltages $U_o / U(U_m)$ from 3.6/6 (7.2) kV up to 20.8/36(42) kV used in power distribution systems of voltages not exceeding the maximum r.m.s. value of the system voltage U_m .

This Part (Part 1) specifies the general requirements applicable to these cables, unless otherwise specified in the particular sections of this HD.

Test methods specified are given in EN 60811, HD 383, HD 405, HD 605 and in IEC Publications 229, 840, 885-2 and 885-3.

Attention should be drawn to the fact that a significant number of sections include references to long term tests which are collected in HD 605. These long term tests are considered as necessary and reflect the best available knowledge for the existing cable design. They are related to specific designs and different philosophies concerning adequate measures against the influence of water. However it is the firm intention to reduce this large number of different tests, but more experience should be gained before starting to rationalise this important matter.

The particular types of cables are specified in Parts 3 to 9.

1.2 Object

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The objects of this Harmonisation Document are:

- to standardise cables that are safe and reliable when properly used, in relation to the technical requirements of the system of which they form a part;
- to state the characteristics and manufacturing requirements which have a direct or indirect bearing on safety;
- and to specify methods for checking conformity with those requirements.

2. Definitions

2.1 Definitions concerning the insulating and sheathing compounds

2.1.1 Insulating and sheathing compounds

The types of insulating and sheathing compounds covered by this HD are listed below, together with their abbreviated designations:

Table 2.1.1 : Insulating and sheathing compounds

| | Insulating and sheathing compounds | See: |
|------------|---|----------------------------------|
| Insulation | a) <i>Thermoplastic:</i> Insulating compounds based on: - Polyvinyl chloride (PVC) | Table 1 |
| | b) <i>Cross-linked:</i> Insulating compounds based on: - Cross-linked polyethylene (XLPE) - Ethylene propylene rubber (EPR) - Hard ethylene propylene rubber (HEPR) | Table 2A Table 2B Table 2C |
| Sheathing | a) <i>Elastomeric:</i> (under consideration) | (Table 3) |
| | b) <i>Thermoplastic:</i> Sheathing compounds based on: - Polyvinyl chloride (PVC) - Polyethylene (PE) | Table 4A Table 4B |

2.1.2 Type of compound

The category in which a compound is placed according to its properties is determined by specific tests. The type designation is not directly related to the composition of the compound.

2.2 Definitions relating to the tests

NOTE: Tests classified as Sample (S) or Routine (R) may be required as part of any type approval schemes.

2.2.1 Type Tests (Symbol T)

Tests required to be made before supplying a type of cable covered by this HD on a general commercial basis in order to demonstrate satisfactory performance characteristics to meet the intended application. These tests are of such a nature that, after they have been made, they need not be repeated unless changes are made in the cable material, design or type of manufacturing process which might change the performance characteristics.

2.2.2 Sample tests (Symbol S)

Tests made on samples of completed cable, or components taken from a completed cable adequate to verify that the finished product meets the design specifications.

2.2.3 Routine tests (Symbol R)

Tests made on all production cable lengths to demonstrate their integrity.

2.2.4 Tests after installation

Tests intended to demonstrate the integrity of the cable and its accessories as installed.

2.3 Rated voltage

The rated voltage of a cable is the reference voltage for which the cable is designed, and which serves to define the electrical tests.

The rated voltage is expressed by the combination of the following values $U_o/U(U_m)$ expressed in kV.

U_o is the r.m.s. value between any insulated conductor and earth (metal covering of the cable).

U is the r.m.s. value between any two phase conductors of a multicore cable or of a system of single-core cables.

U_m is the maximum r.m.s. value of the highest system voltage for which the equipment may be used.

The standard rated voltages $U_o/U(U_m)$, in kV r.m.s., of the cables in this HD are as follows:

| | | | | | |
|----------------|-------------|---|--------------|---|-------------|
| $U_o/U(U_m) =$ | 3.6/6(7.2) | - | 3.8/6.6(7.2) | - | 6/10(12) |
| | 6.6/11(12) | - | 8.7/15(17.5) | - | 12/20(24) |
| | 12.7/22(24) | - | 15/20(24) | - | 15/25(30) |
| | 18/30(36) | - | 19/33(36) | - | 20.8/36(42) |

In an alternating current system, the rated voltage of a cable shall be at least equal to the nominal voltage of the system for which it is intended. If used in d.c. systems, the maximum voltage has to be specified in the particular sections.

3. Marking

3.1 Indication of origin

Cables shall be provided with an identification of origin consisting of the continuous marking of the manufacturer's name or trademark, or (if legally protected) identification number by one of the two following alternative methods:

- (a) printed tape within the cable;
(b) printing, indenting or embossing on the outer surface of the cable.

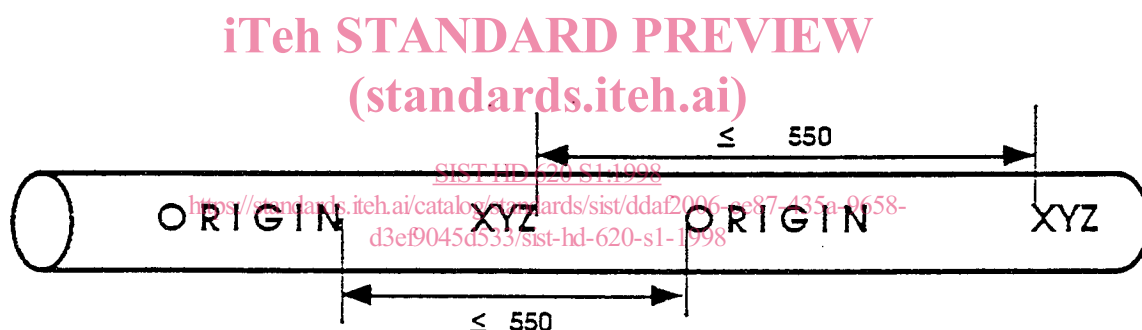
3.1.1 Continuity of marks

Unless otherwise specified in the particular sections, each specified mark shall be regarded as continuous if the distance between the end of the mark and the beginning of the next identical mark does not exceed:

- 550 mm if the marking is on the outer surface of the cable,
- 275 mm if the marking is on a tape.

NOTE: A 'specified mark' is any mandatory mark covered by this Part of the HD or by the particular requirements of Part 3 onwards of this HD.

The diagram below shows an example of the marking as used on the outer surface of the cable, where the word 'ORIGIN' is for the mandatory information required by the sub-clause 3.1, and 'XYZ' is one of any other mandatory marks.



3.2 Additional marking

Additional marking requirements may be specified in the particular sections.

3.3 Durability

Printed markings shall be durable. Durability shall be checked by the test given in sub-clause 2.5.4 of HD 605.

The printed legend shall be legible after carrying out the test.

3.4 Legibility

All markings shall be legible. Printed markings shall be in contrasting colours.

3.5 Common marking

Under consideration

3.6 Use of the name CENELEC

The name CENELEC, in full or abbreviated, shall not be marked directly on or in the cables.

4. Construction of cables

Compliance with the requirements specified in sub-clauses 4.1 to 4.11 and in the particular sections of this HD shall be checked by inspection and by measurement according to the test methods in the documents listed in the particular sections of this HD.

4.1 Conductors

4.1.1 Material

Conductors shall be either plain or metal-coated annealed copper or plain or metal-sheathed aluminium (earthing conductor) or aluminium alloy in accordance with HD 383 and the particular requirements in the particular sections of this HD.

Conductors shall be either circular or sector in shape, and of solid metal or stranded.

4.1.2 Electrical resistance

The resistance of each conductor at 20°C shall be in accordance with the requirements in HD 383 for the given class of conductor.

4.2 Insulation

4.2.1 Material

The insulation shall be extruded solid compound of one of the types listed in sub-clause 2.1.1 and as specified for each type of cable in the particular sections of this HD.

The test requirements for the insulating compounds are specified in Tables 1, 2A, 2B and 2C and the reference to the test methods are specified in the particular sections.

4.2.2 Application

The insulation shall be applied by an extrusion process and shall form a compact and homogeneous body. Special requirements may be given in the particular sections.

It shall be so applied that it fits closely on the conductor or conductor screen, if any, and it shall be possible to remove the insulation, including conductor screen or insulation screen if bonded.

4.2.3 Thickness

The mean value of the thickness of the insulation, excluding semi-conducting layers, shall not be less than the value specified in the particular sections.

However, the thickness at any place may be less than the specified value provided that the difference does not exceed $0.1 \text{ mm} + 10 \%$ of the specified value.

Compliance shall be checked by the test method given in HD 605, sub-clause 2.1.1.

4.2.4 Mechanical properties before and after ageing

The insulation shall have appropriate mechanical characteristics.

Compliance shall be checked by carrying out the tests specified in Tables 1, 2A, 2B and 2C.

4.2.5 Additional properties

These are specified in the particular sections.

4.3 Screening of cores

4.3.1 Core screening

Screening of cores, if required (see sub-clause 4.3.4), shall consist of conductor screening and insulation screening.

4.3.2 Conductor screening

The conductor screening shall consist of a non-metallic semi-conducting part and shall fulfil the requirements specified in the particular sections.

4.3.3 Insulation screening

The insulation screen shall consist of a non-metallic semi-conducting part in combination with a metallic part.

The non-metallic part shall be applied directly upon the insulation of each core and in intimate contact, and shall fulfil the requirements specified in the particular sections.

The metallic part shall be applied over the individual cores or over the core assembly and shall comply with sub-clause 4.8.

4.3.4 Screening limits for the cores

Unless otherwise specified the screening limits for the cores are:

- compulsory for all cables with XLPE insulation
- compulsory for cables with PVC, EPR or HEPR insulation and U_0/U_m above 3.6/6 (7.2) kV.