



**SLOVENSKI STANDARD**  
**SIST HD 620 S1:1998/A1:2002**  
**01-april-2002**

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**Amendment to HD according to maintenance programme - Group 2**

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/A1:2001**

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**ICS:**

29.060.20      Kabli      Cables

**SIST HD 620 S1:1998/A1:2002**      en

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HARMONIZATION DOCUMENT

**HD 620 S1/A1**

DOCUMENT D'HARMONISATION

(Volume I: Parts 1 to 5)

HARMONISIERUNGSDOKUMENT

July 2001

ICS 29.060.20

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 inclus

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

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This amendment A1 modifies the Harmonization Document HD 620 S1:1996; it was approved by CENELEC on 2000-08-01. 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).

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 to HD 620 S1:1996 has been prepared by WG9 of CENELEC TC20 "Electric Cables". CENELEC TC20 confirmed at its Dublin meeting (April 1997) that the amendment should go to the Unique Acceptance Procedure.

Part 1 has been completely re-issued, due to extensive changes to the tables of compounds, and to the complete withdrawal of cable types with PVC insulation. Because of this withdrawal of PVC insulated cables, Parts 3 and 4 are now designated "Spare". A list of additions and amendments to the particular sections of Parts 5-9 is given in this Part 0.

NOTE During the preparation of this amendment, IEC 502 (4th edition) has been replaced by IEC 60502-2. In general the updating of these references has not been included in this amendment unless a complete section has been introduced or replaced. Users should refer to IEC 60502-2 for the most up-to-date information, but note that the clause numbers are not identical to those in IEC 502 (4th edition).

The draft was submitted to the Unique Acceptance Procedure in September 1999 and was approved by CENELEC as amendment A1 to HD 620 S1:1996 on 2000-08-01.

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 2001-02-01
- latest date by which the amendment has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2002-01-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2003-08-01

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<sup>(1)</sup> A1 introduces some changes to the text<sup>(2)</sup> A1 completely revises the Particular Section<sup>(3)</sup> Item withdrawn by A1<sup>(4)</sup> A1 introduces new Section

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<sup>(3)</sup> Item withdrawn by A1

<sup>(4)</sup> A1 introduces new Section

HD 620 S1:1996/A1:2001

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

*Replace the complete part by the following:*

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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	Insulating and sheathing materials of electric cables – Common test methods
HD 383	Conductors of insulated cables (Endorsing IEC 60228 and IEC 60228A)
HD 405	Tests on electric cables under fire conditions (Endorsing IEC 60332)
HD 605	Electric cables – Additional test methods
IEC 60229	Tests on cable oversheaths which have a special protective function and are applied by extrusion
IEC 60287	Electric cables – Calculation of the current rating
IEC 60840	Tests for power cables with extruded insulation for rated voltages above 30 kV ( $U_m = 36$ kV) up to 150 kV ( $U_m = 170$ kV)
IEC 60885	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  $U_0/U(U_m)$  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 EN 60811, HD 383, HD 405, HD 605 and in IEC 60229, IEC 60840, IEC 60885-2 and IEC 60885-3.

NOTE 1 HD 405 is currently under revision. Parts 1 and 2 will be re-issued within EN 50265, and Part 3 as EN 50266.

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 5 to 9

NOTE 2 Cables originally in Parts 3 and 4 have now been withdrawn.

### 1.2 Object

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> (spare) b) <i>Cross-linked:</i> Insulating compounds based on: <ul style="list-style-type: none"> <li>- Cross-linked polyethylene (XLPE)</li> <li>- Ethylene propylene rubber (EPR)</li> <li>- Hard ethylene propylene rubber (HEPR)</li> </ul>	Table 2A Table 2B Table 2C
Sheathing	a) Elastomeric (under consideration) b) <i>Thermoplastic:</i> Sheathing compounds based on: <ul style="list-style-type: none"> <li>- Polyvinyl chloride (PVC)</li> <li>- Polyethylene (PE)</li> <li>- Polyolefine (PO)</li> </ul>	(Table 3)  Table 4A Table 4B Table 4C

### 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

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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

Test 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 phase 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)
	6,35/11(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.

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## 3 Marking

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### 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:

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

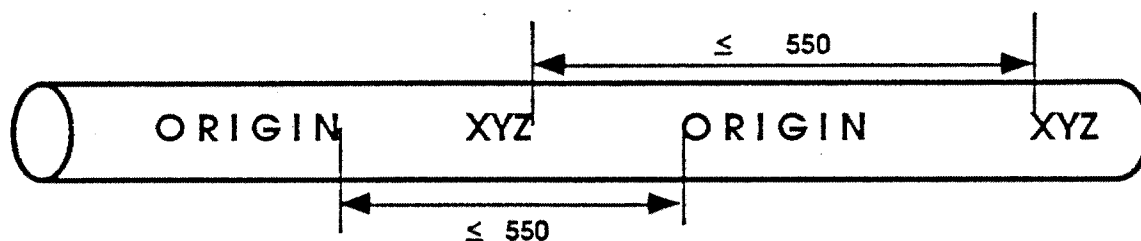
#### 3.1.1 Continuity of marks

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 subclause 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 subclause 2.5.4 of HD 605.

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

### 3.4 Legibility

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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 subclauses 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 subclause 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 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 mm + 10% of the specified value.

Compliance shall be checked by the test method given in HD 605, subclause 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 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 subclause 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 subclause 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 EPR or HEPR insulation and  $U_o/U(U_m)$  above 3,6/6 (7,2) kV.

### 4.4 Assembly of cores

In three-core cables, the cores shall be laid-up. The direction of lay is specified in the particular sections.

Auxiliary cores, if any, shall be laid-up in the interstices between main cores. Allowed number and requirements thereof are specified in the particular sections.

### 4.5 Fillers and binder tapes

For each type of cable, the particular sections detail whether that cable includes fillers or tapes, or whether the sheath or inner covering may penetrate between the cores, thus forming a filling. It shall be possible to remove fillers without damage to cores.

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A centre filler may be used in three-core cables, and the assembly of cores and fillers may be held together by a binder tape, or tapes.

Fillers and binder tapes, if any, shall be composed of a suitable material.

For cables with core screening having a concentric metallic part over the assembly, the fillers may be semi-conducting.

When fillers or binder tapes are applied, they shall be compatible with the other components. Compliance with this requirement shall be checked by the test specified in subclause 8.1.4 of EN 60811-1-2 for the appropriate maximum conductor temperature in normal operation, unless stated otherwise in the particular sections.

### 4.6 Inner covering (bedding)

The inner covering, if any, may be extruded or lapped, or a combination of the two, as specified in the particular section.

#### 4.6.1 Material

The material used for inner coverings shall be suitable for use at the maximum conductor temperature of the cable in normal operation and compatible with the cable components with which it is in contact.

For radial field cables having a concentric metallic part over the assembly, the inner covering shall be semi-conducting.