



# SLOVENSKI STANDARD

## SIST HD 620 S2:2010

01-maj-2010

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

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

Energieverteilungskabel mit extrudierter Isolierung für Nennspannungen von 3,6/6 (7,2) kV bis einschließlich 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 S2:2010**

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**ICS:**

29.060.20

Kabli

Cables

**SIST HD 620 S2:2010**

**en,fr,de**

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HARMONIZATION DOCUMENT  
DOCUMENT D'HARMONISATION  
HARMONISIERUNGSDOKUMENT

**HD 620 S2**

January 2010

ICS 29.060.20

Supersedes HD 620 S1:1996 + A1:2001 + A2:2003 + A3:2007 + corr. Dec.2007

English version

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

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This Harmonization Document was approved by CENELEC on 2009-12-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

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

This Harmonization Document was established by CENELEC in English only.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

This Harmonization Document was prepared by WG 9 of 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 602 S2 on 2009-12-01.

It supersedes HD 620 S1:1996, A1:2001, A2:2003 and A3:2007 plus its corrigendum of Dec. 2007.

In this revision of HD 620 the previous Parts 5 and 6 have been consolidated to become Part 10, and Parts 7 and 8 likewise to become Part 11.

Users of HD 620 should note that, in accordance with the decision of the Technical Board (D130/040), national standards implementing one or more particular sections of HD 620 may be further updated in advance of future amendments to the published version of the HD. This is explained more fully in document TC20/Sec1596/R. This document is available via National Committees and will be updated on an annual basis.

The following dates were fixed:

- latest date by which the HD has to be implemented  
at national level by publication of a harmonized  
national standard or by endorsement (dop) 2010-12-01
- latest date by which the national standards conflicting  
with the HD have to be withdrawn (dow) 2012-12-01

By decision of the Technical Board (D81/139 extended by D104/118 & D114/076) this HD exists only in English.

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**DISTRIBUTION CABLES WITH EXTRUDED INSULATION FOR RATED VOLTAGES  
FROM 3,6/6 (7,2) kV UP TO AND INCLUDING 20,8/36 (42) kV**

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**PART 1:**

**GENERAL REQUIREMENTS**

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## References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60228	Conductors of insulated cables (IEC 60228)
EN 60229	Electric cables – Tests on extruded oversheaths with a special protective function (IEC 60229)
EN 60332-1-2	Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame (IEC 60332-1-2)
EN 60811 series	Insulating and sheathing materials of electric and optical cables – Common test methods (IEC 60811 series)
EN 60885-3	Electrical test methods for electric cables – Part 3: Test methods for partial discharge measurements on lengths of extruded power cables (IEC 60885-3)
HD 605	Electric cables – Additional test methods
HD 632	Power cables with extruded insulation and their accessories for rated voltages above 36 kV ( $U_m = 42$ kV) up to 150 kV ( $U_m = 170$ kV)
IEC 60183	Guide to the selection of high-voltage cables
IEC 60287 series	Electric cables – Calculation of the current rating

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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 EN 60228, EN 60229, EN 60332-1-2, EN 60811, EN 60885-3, HD 605 and HD 632.

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 9 to 11.

NOTE Cables originally in Parts 3, 4, 5, 6, 7 and 8 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**

	<b>Insulating and sheathing compounds</b>	<b>See:</b>
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

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.

NOTE 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.

### 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:

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

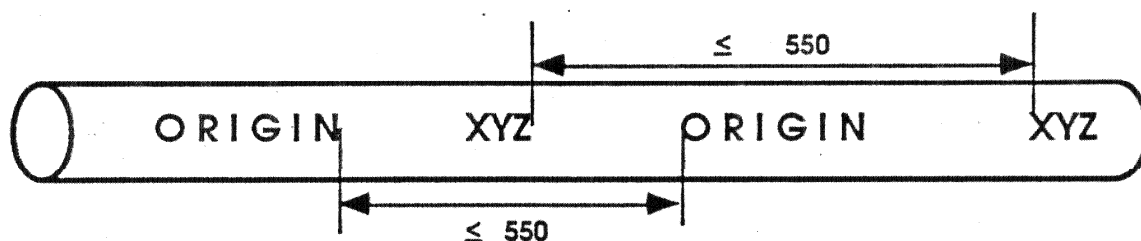
##### 3.1.1 Continuity of marks

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 9 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 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

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 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 EN 60228 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 EN 60228 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 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 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 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  $U_0/U_m$  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.

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.