
Distribucijski kabli z ekstrudirano izolacijo za naznačene 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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HD 620 S3

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English Version

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from 3,6/6 (7,2) kV up to and including 20,8/36 (42) kV**

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tensions assignées de 3,6/6 (7,2) kV à 20,8/36 (42) kV
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This Harmonization Document was approved by CENELEC on 2023-03-13. 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 CEN-CENELEC Management Centre or to any CENELEC member.

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

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Foreword

This document (HD 620 S3:2023) has been prepared by WG 9 of CLC/TC 20, "Electric cables".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-03-13
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2026-03-13

This document supersedes HD 620 S2:2010 and all of its amendments and corrigenda (if any).

HD 620 S3:2023 includes the following significant technical changes with respect to HD 620 S2:2010:

- a new Part 12 has been added to include thermoplastic insulations operating at 90°C.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

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Contents

(HD 620 S3:2023)

PART 1 General requirements

PART 2 (Spare)

PART 3 (Spare)

PART 4 (Spare)

PARTS 5 & 6 (Spare – previously combined as new Part 10)

PARTS 7 & 8 (Spare – previously combined as new Part 11)

PART 9 HEPR insulated single core cables, and single core pre-assembled cables

9-E Cables with polyolefine compound sheath (Types 9E-1, 9E-3, 9E-4 and 9E-5)

9-I Cables with HEPR insulation and PVC sheath, single core

PART 10 XLPE insulated single core and 3 core cables, and single core pre-assembled cables

10-A Cables with XLPE insulation; PE or PVC sheath

10-B Cables with XLPE insulation; PE or PVC or polyolefine compound sheath

10-C Cables with XLPE insulation; PE or PVC sheath

10-D Cables with XLPE insulation, PE or PVC or polyolefine sheath

10-E1 Cables with polyolefine compound sheath (Types 10E-1, 10E-3, 10E-4 and 10E-5)

10-E2 Cables with aluminium tape screen and polyolefin compound sheath (Types 10E-6, 10E-7, 10E-8, and 10E-9)

10-F Single-core cables with PVC sheath (Type 10F-1),
 Single-core cables with PE sheath, laid-up (Type 10F-2),
 Cables with PE sheath, laid-up around a bare earth conductor (Type 10F-3),
 Cables with aluminium conductors and PE sheath, laid-up around a steel messenger (Type 10F-4),
 Cables with solid aluminium conductors and PE sheath, laid-up (Type 10F-5),
 Cables with aluminium conductors and PE sheath, laid-up around an insulated steel messenger (Type 10F-6),
 Cables with common PVC sheath and individual copper screen (Type 10F-11),
 Cables with common PE sheath and individual copper screen (Type 10F-12),
 Cables with common PE sheath and common copper screen (Type 10F-13),
 Cables with common PVC sheath and common copper screen (Type 10F-14)

10-G Cables with PVC or PE sheath, laid up (Type 10G-1),
 Cables with PVC or PE sheath, laid up around a messenger (Type 10G-2),
 Cables with PVC or PE sheath, not laid up (Type 10G-3),
 Cables with PVC or PE sheath, laid up (Type 10G-4),
 Cables with PVC or PE sheath, not laid up (Type 10G-5)

- 10-I1 Triplexed medium voltage cables, aluminium conductor with XLPE insulation of reduced thickness, aluminium tape screen and PE outer sheath for direct burying
- 10-I2 Triplexed medium voltage cables with XLPE insulation of reduced thickness, aluminium tape screen and PE sheath, laid up around an aluminium clad steel messenger
- 10-I3 Triplexed medium voltage cables, aluminium conductor with XLPE insulation of reduced thickness, aluminium tape screen and PE outer sheath with improved impact performance
- 10-J Single core and three core cables with PE sheath (Type 10J-1), or PVC sheath (Type 10J-2), or PVC-flame retardant sheath (Type 10J-3)
- 10-K Cables with PE sheath (Type 10K-1), or PVC sheath (Type 10K-2), or Low smoke Halogen-free sheath (Type 12K-3)
- 10-L Cables with PVC, Polyolefin, or XLPE sheath
- 10-M Single and three core cables with PE sheath (Type 10M-1) and PVC sheath (Type 10M-2)
- 10-N Cables with PE sheath (Type 10N)
- 10-O XLPE insulated cables: 11 kV and 33 kV copper wire screened with PE or polyolefine sheath, and 33 kV lead sheathed with PE oversheath
- 10-P Cables with PVC sheath laid up around an earth conductor (Type 10P-1 and Type 10P-2), cables with PVC sheath laid around a messenger (Type 10P-3)
- 10-R Cables with XLPE insulation, PE or PVC sheath

PART 11 EPR insulated single core and 3 core cables

- 11-N EPR insulated cables with PE sheath (Type 11N)
- 11-O EPR insulated cables: 11 kV and 33 kV copper wire screened with PE or polyolefine sheath

PART 12 PP-TPE insulated single core, single core reassembled, and three core cables

- 12-I Triplexed medium voltage cables, aluminium conductor with PP-TPE insulation of reduced thickness, aluminium tape screen and PE outer sheath for direct burying
- 12-J Single core and three core cables with PE sheath (Type 12J-1) or PVC sheath (Type 12J-2) or PVC-flame retardant sheath (Type 12J-3)
- 12-K Cables with PE Sheath (TYPE 12 K-1), PVC Sheath (TYPE 12 K-2) or Low smoke Halogen-free sheath (Type 12 K-3)

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HD 620 S3:2023

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

SIST HD 620 S3:2023

PART 1:

GENERAL REQUIREMENTS

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Contents	Page
1 General.....	3
1.1 Scope.....	3
1.2 Object.....	3
2 Definitions.....	3
2.1 Definitions concerning the insulating and sheathing compounds	3
2.2 Definitions relating to the tests	4
2.3 Rated voltage.....	4
3 Marking	5
3.1 Indication of origin.....	5
3.2 Additional marking	5
3.3 Durability	5
3.4 Legibility.....	5
3.5 Common marking	6
3.6 Use of the name CENELEC	6
4 Construction of cables	6
4.1 Conductors	6
4.2 Insulation	6
4.3 Screening of cores	7
4.4 Assembly of cores	7
4.5 Fillers and binder tapes	7
4.6 Inner covering (bedding).....	7
4.7 Inner sheath	8
4.8 Metallic coverings	8
4.9 Outer sheath	9
4.10 Earthing conductor.....	9
4.11 Messenger	9
5 Tests on completed cables	10
6 Sealing and packing	10
7 Current-carrying capacity	10
8 Guide to use and selection of cables	10
Annex A (informative) Guide to Use and selection of cables	30

References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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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<https://standards.iteh.ai/catalog/standards/sist/eb543615-912e-4a28-b0c5-acadeab02cd8/sist-hd-620-s3-2023>

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.

The particular types of cables are specified in Parts 9 to 12.

NOTE Parts 3, 4, 5, 6, 7 and 8 were withdrawn in HD 620 S2.

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 in Table 2.1.1 and Table 2.1.2 respectively, together with their abbreviated designations:

Table 2.1.1 – Insulating compounds

Insulating compounds	See table for requirements:
a) <i>Cross-linked:</i> Insulating compounds based on: <ul style="list-style-type: none"> - Cross-linked polyethylene (XLPE) Table 2A - Ethylene propylene rubber (EPR) Table 2B - Hard ethylene propylene rubber (HEPR) Table 2C 	
b) <i>Thermoplastic:</i> <ul style="list-style-type: none"> - Polypropylene Thermoplastic Elastomer (PP-TPE) Table 2D 	

The insulating materials used in cables with rated voltages from 3,6/6 kV to 20,8/36 kV shall be appropriate for use at a continuous operating temperature of 90°C.

NOTE Thermoplastic PVC insulating material, with rated temperature of less than 90°C were withdrawn from this HD and are no longer referenced since publication of HD 620 S1:1996 A1:2001.

A small number of cables are designed to operate above 90°C, when this is the case, they need to utilize materials rated at these elevated temperatures. The maximum continuous operating temperatures associated with each material are given in the relevant tables of requirements for insulating compounds, Tables 2A, 2B, 2C, or 2D.

Table 2.1.2 – Sheathing compounds

Sheathing Compounds	See table for requirements:
a) <i>Elastomeric</i> (spare)	(Table 3)
b) <i>Thermoplastic</i> : Sheathing compounds based on:	
- Polyvinyl chloride (PVC)	Table 4A
- Polyethylene (PE)	Table 4B
- Polyolefin (PO)	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 chemical 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 $U_0/U(U_m)$ expressed in kV.

U_0 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 $U_0/U(U_m)$, in kV r.m.s., of the cables in this HD are as follows:

$U_0/U(U_m)$	= 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 DC. 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.

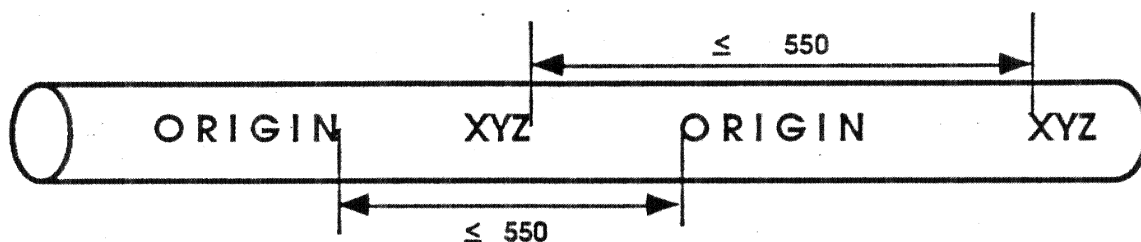
3.1.1 Continuity of marks

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, 2C, and 2D 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, 2C, and 2D.

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 or PP-TPE 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.

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 4.2.3.4 of EN 60811-401 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.

4.6.2 Application

The extruded inner covering shall surround the core assembly completely and may penetrate the spaces between them. The extruded inner covering shall be separable without damage to the cores.

Lapped covering shall consist of one or more layers of tape covering the entire outer surface of the core assembly.

For each type of cable, the particular sections indicate whether that cable includes an extruded or lapped inner covering, or a combination of these.

4.6.3 Thickness

Unless otherwise specified in the particular sections the thickness of the extruded or lapped inner covering need not be checked by measurement.

4.7 Inner sheath

An inner sheath may be specified in the particular sections.

4.7.1 Material

The material used for the extruded inner sheath 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.

Test requirements and references to test methods for the inner sheath are given in Tables 4A, 4B and 4C unless stated otherwise in the particular sections.

4.7.2 Application

The inner sheath shall be extruded in a single layer. The sheath may be applied over an inner covering or directly over the core assembly or over a collective metallic screen. The sheath shall not adhere to the cores.

4.7.3 Thickness

The mean value of the thickness of the inner sheath shall be not less than the specified value for each type and size of cable in the particular sections.

However, unless otherwise specified in the thickness at any place may be less than the specified value provided that the difference does not exceed 0,2 mm + 20 % of the specified value.

Compliance shall be checked by the test method given in HD 605, Subclause 2.1.2.

4.7.4 Mechanical properties before and after ageing

The sheath shall have appropriate mechanical characteristics.

Compliance shall be checked by carrying out the tests given in Tables 4A, 4B and 4C unless stated otherwise in the particular sections.

4.7.5 Other properties

Other properties are specified in the particular sections.

4.8 Metallic coverings

Cables shall have a metallic layer surrounding the cores individually or collectively.

The following types of metallic covering may be specified in the particular sections:

- a) metallic screen
- b) metal sheath
- c) metallic armour