SLOVENSKI STANDARD
SIST HD 632 S1:1999/A1:2002

01-november-2002

Revision of HD according to maintenance schedule - Group 5

Power cables with extruded insulation and their accessories for rated voltages above 36 kV (Um = 42 kV) up to 150 kV (Um = 170 kV)

Starkstromkabel mit extrudierter Isolierung und ihre Garnituren für Nennspannungen über 36 kV (Um = 42 kV) bis 150 kV (Um = 170 kV)

Câbles d'énergie à isolation extrudée et leurs accessoires pour des tensions assignées supérieures à 36 kV (Um = 42 kV) et jusqu'à 150 kV (Um = 170 kV)

Ta slovenski standard je istoveten z: HD 632 S1:1998/A1:2002

ICS:

29.060.20 Kabli Cables

SIST HD 632 S1:1999/A1:2002 en

HARMONIZATION DOCUMENT **HD 632 S1/A1**

DOCUMENT D'HARMONISATION

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ICS 29.060.20

English version

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)

Câbles d'énergie à isolation extrudée et leurs accessoires pour des tensions assignées supérieures à 36 kV (U_m = 42 kV) et jusqu'à 150 kV (U_m = 170 kV)

Starkstromkabel mit extrudierter Isolierung und ihre Garnituren für Nennspannungen über 36 kV (U_m = 42 kV) bis 150 kV (U_m = 170 kV)

This amendment A1 modifies the Harmonization Document HD 632 S1:1998; it was approved by CENELEC on 2002-03-01. 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 two official versions (English, French).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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

Ref. No. HD 632 S1:1998/A1:2002 E

FOREWORD

This amendment to the Harmonization Document HD 632 S1:1998 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 amendment A1 to HD 632 S1 on 2002-03-01.

Part 1, “General test requirements” has been fully revised and amendments have been made to Part 2 “Additional test methods”.

A list of additions and amendments to the particular sections of Parts 3 to 11 is given in this Part 0.

NOTE During the preparation of this amendment, HD 405.1 has been superseded by EN 50265 and HD 48 by EN 60230. In general, the updating of these references has not been included in this amendment unless a complete part or section has been replaced. Users should refer to the new standard for the most up-to-date information.
National standards implementing one or more particular sections of HD 632 may update cross-references in advance of changes to the published version of the HD.

By decision of the Technical Board (D81/139), this HD exists only in English and French.

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 2002-09-01
- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2003-03-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2005-03-01

CONTENTS
(HD 632 S1:1998 plus A1:2002)

[1] Amendment A1 introduces a completely revised part or section.
[2] Amendment A1 introduces some amendments to the text.

4-G [1)]	Cables with XLPE insulation and metal-laminated screen and their accessories (Test list 4G)
4-K [1)]	Cables with XLPE insulation, copper screen and aluminium-laminated sheath and their accessories (Test list 4K)
4-L	Cables with XLPE insulation, copper screen and aluminium-laminated sheath and their accessories (Test list 4L)
4-M	Cables with XLPE insulation, copper screen and aluminium-laminated sheath and their accessories (Test list 4M)
4-O	Cables with XLPE insulation, copper or aluminium screen and copper or aluminium laminated sheath and their accessories (Test list 4O)
4-P [1)]	Cables with XLPE insulation, copper screen and metal-laminated sheath and their accessories (Test list 4P)

PART 5 **Test requirements for cables with XLPE insulation and metallic sheath and their accessories**

5-A	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5A)
5-B	Cables with XLPE insulation and lead or lead alloy sheath and their accessories (Test list 5B)
5-C [1)]	Cables with XLPE insulation and lead or lead alloy sheath and their accessories (Test list 5C)
5-D	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5D)
5-E	Cables with XLPE insulation and lead or lead alloy sheath and their accessories (Test list 5E)
5-F	Cables with XLPE insulation and lead or lead alloy sheath and their accessories (Test list 5F)
5-G [1)]	Cables with XLPE insulation and lead sheath and their accessories (Test list 5G)
5-H [1)]	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5H)
5-I	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5I)
5-K [1)]	Cables with XLPE insulation and lead sheath and their accessories (Test list 5K)
5-L	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5L)
5-M	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5M)
5-N [2)]	Cables with XLPE insulation and lead sheath and their accessories (Test list 5N)
5-O	Cables with XLPE insulation and metallic sheath and their accessories (Test list 5O)
5-P [1)]	Cables with XLPE insulation and lead alloy sheath and their accessories (Test list 5P)

PART 6 **Test requirements for cables with EPR insulation and metallic screen and their accessories**

6-A Cables with EPR insulation and metallic screen and their accessories (Test list 6A)
6-J [1)] Cables with HEPR insulation and copper screen and their accessories (Test list 6J)
6-O Cables with EPR insulation and copper or aluminium screen and their accessories (Test list 6O)

PART 7 **Test requirements for cables with EPR insulation, metallic screen and metal-laminated sheath and their accessories**

7-A Cables with EPR insulation, metallic screen and metal-laminated sheath and their accessories (Test list 7A)
7-O Cables with EPR insulation, copper or aluminium screen and copper or aluminium-laminated sheath and their accessories (Test list 7O)

PART 8 **Test requirements for cables with EPR insulation and metallic sheath and their accessories**

8-A Cables with EPR insulation and metallic sheath and their accessories (Test list 8A)
8-J [1)] Cables with HEPR insulation and metallic sheath and their accessories (Test list 8J)
8-O Cables with EPR insulation and metallic sheath and their accessories (Test list 8O)

PART 9 **Test requirements for cables with PE or HDPE insulation and metallic screen and their accessories**

9-A Cables with PE or HDPE insulation and metallic screen and their accessories (Test list 9A)

PART 10 **Test requirements for cables with PE or HDPE insulation, metallic screen and metal-laminated sheath and their accessories**

10-A Cables with PE or HDPE insulation, metallic screen and metal-laminated sheath and their accessories (Test list 10A)
10-G [1)] Cables with PE or HDPE insulation and metal-laminated screen and their accessories (Test list 10G)

PART 11 **Test requirements for cables with PE or HDPE insulation and metallic sheath and their accessories**

11-A Cables with PE or HDPE insulation and metallic sheath and their accessories (Test list 11A)

11-G [1)] Cables with PE or HDPE insulation and lead sheath and their accessories (Test list 11G)

PART 1 – GENERAL TEST REQUIREMENTS

Replace the complete Part 1 by the following:

PART 1: GENERAL TEST REQUIREMENTS

CONTENTS

1 General

1.1 Scope

This standard specifies test requirements for power cables with extruded insulation, of the types listed in 1.5 and their accessories, for rated voltages above 36 kV (U_m = 42 kV) up to and including 150 kV (U_m = 170 kV) for fixed installations intended for transmission and distribution systems, and for use in power generating plants and sub-stations.

However, the summary of tests as listed in one only of the particular sections in Parts 3 to 11 of this HD is mandatory for the particular cables ordered.

In these parts each section is an individual alternative to Part 1.

Depending on the design and the system conditions, additional or even fewer tests or other requirements which are not described in the Part 1 can be specified in these particular sections of Parts 3 to 11.

The requirements apply to single-core cables and to three-core cables with separate cores and to their accessories for usual conditions of installation and operation, but not to special cables and their accessories, such as submarine cables, for which modifications to the standard tests may be necessary or special test conditions may need to be devised.

1.2 Normative references

This Harmonization Document 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 this Harmonization Document only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50265-2-1	*Common test methods for cables under fire conditions - Test for resistance to vertical flame propagation for a single insulated conductor or cable Part 2-1: Procedures - 1 kW pre-mixed flame*
EN 60230	*Impulse tests on cables and their accessories*
EN 60811-1-1	*Insulating and sheathing materials of electric and optical cables - Common test methods Part 1-1: General application - Measurement of thickness and overall dimensions – Tests for determining the mechanical properties (IEC 60811-1-1)*
EN 60811-1-2	*Insulating and sheathing materials of electric cables - Common test methods Part 1-2: General application - Thermal ageing methods (IEC 60811-1-2)*
EN 60811-1-3	*Insulating and sheathing materials of electric and optical cables - Common test methods Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test (IEC 60811-1-3)*
EN 60811-1-4	*Insulating and sheathing materials of electric and optical cables - Common test methods Part 1-4: General application - Tests at low temperature (IEC 60811-1-4)*
EN 60811-2-1	*Insulating and sheathing materials of electric and optical cables - Common test methods Part 2-1: Methods specific to elastomeric compounds - Ozone resistance, hot set and mineral oil immersion tests (IEC 60811-2-1)*
EN 60811-3-1	*Insulating and sheathing materials of electric cables - Common test methods Part 3-1: Methods specific to PVC compounds - Pressure test at high temperature - Tests for resistance to cracking (IEC 60811-3-1)*
EN 60811-3-2	*Insulating and sheathing materials of electric and optical cables - Common test methods Part 3-2: Methods specific to PVC compounds - Loss of mass test - Thermal stability test (IEC 60811-3-2)*

EN 60811-4-1	*Insulating and sheathing materials of electric cables - Common test methods Part 4-1: Methods specific to polyethylene and polypropylene compounds - Resistance to environmental stress cracking - Wrapping test after thermal ageing in air - Measurement of the melt flow index - Carbon black and/or mineral content measurement in PE (IEC 60811-4-1)*
HD 383	*Conductors of insulated cables - First supplement: Guide to the dimensional limits of circular conductors (IEC 60228 and IEC 60228A, mod.)*
HD 588.1	*High-voltage test techniques -- Part 1: General definitions and test requirements*
HD 605	*Electric cables - Additional test methods*
IEC 60183	*Guide to the selection of high-voltage cables*
IEC 60229	*Tests on cable oversheaths which have a special protective function and are applied by extrusion*
IEC 60502-2	*Power cables with extruded insulation and their accessories for rated voltages from 1 kV (U_m = 1,2 kV) up to 30 kV (U_m = 36 kV) Part 2: Cables for rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)*
IEC 60885-2	*Electrical test methods for electric cables Part 2: Partial discharge tests*
IEC 60885-3	*Electrical test methods for electric cables Part 3: Test methods for partial discharge measurements on lengths of extruded power cables*

1.3 Rated voltages

In this standard the symbols U_0, U and U_m are used to designate the rated voltages of cables and accessories, where these symbols have the meanings given in IEC 60183.

1.4 Relationship of test voltages to rated voltages

Where test voltages are specified in this standard as multiples of the rated voltage U_0, the value of U_0 for the determination of the test voltages shall be as specified in Table 1.

For cables and accessories of rated voltages not shown in the table, the value of U_0 for determination of test voltages may be the same as for the nearest rated voltage which is given, provided that the value of U_m for the cable and accessory is not higher than the corresponding value in the table. Otherwise, and particularly if the rated voltage is not close to one of the values in the table, the value of U_0 on which the test voltages are based shall be the rated value, i.e. U divided by $\sqrt{3}$.

The test voltages in the standard are based on the assumption that the cables and accessories are used on systems of category A, as defined in IEC 60183.

1.5 Cable insulating materials

This standard applies to cables insulated with the materials listed in Table 2, which also specifies for cables with each type of insulating compound the maximum operating conductor temperatures on which the specified test conditions are based.

1.6 Precautions against water penetration in cables

A water impermeable barrier around the cable is recommended. Tests for radial water penetration are not included in this standard.

A test for longitudinal water penetration is given in 5.6.16.

1.7 Non-metallic cable sheathing materials

Tests are specified for four types of non-metallic sheath, as follows:

- ST_1 and ST_2 based on PVC;
- ST_3 and ST_7 based on polyethylene.

The choice of the type of sheath will depend on the design of the cable and the mechanical and thermal constraints during operation.

NOTE The temperature limits given in IEC 60502-2 need not apply to this standard.

1.8 Cable characteristics

For the purpose of carrying out and recording the tests described in this standard, the following characteristics shall be known or declared.

1.8.1 Rated voltage: values shall be given for U_0, U, U_m (see 1.3 and 1.4).

1.8.2 Type of conductor, its material and nominal cross-sectional area, in square millimetres. Presence, if any, and nature of measures taken to achieve longitudinal watertightness.

1.8.3 If the nominal cross-sectional area is not in accordance with HD 383, the d.c. conductor resistance shall be declared.

1.8.4 Nature of insulating material (see 1.5). If the insulation is XLPE, special additives shall be declared if the higher value of tan δ according to Table 2 is valid.

1.8.5 Nominal thickness of insulation.

1.8.6 Presence, if any, and nature of watertightness measures in screening area.

1.8.7 Nature and construction of metallic sheath, if any. Otherwise, nature, construction and thickness of metallic screen.

1.8.8 Nature of non-metallic sheathing material.

1.8.9 Nominal diameter over conductor (d).

1.8.10 Nominal diameter over completed cable (D).

1.8.11 Nominal capacitance between conductor and metallic screen/sheath.

1.9 Accessory characteristics

For the purpose of carrying out and recording the tests described in this standard, the following characteristics shall be known or declared.

1.9.1 Cables used for testing shall comply with Clauses 1 to 5 and shall be correctly identified as in 1.8.

1.9.2 Conductor connectors used within the accessories shall be correctly identified with respect to:
- assembly technique,
- tooling and necessary setting,
- preparation of contact surfaces,
- type, reference number and any other identification of the connector.

1.9.3 Accessories to be tested shall be correctly identified with respect to:
- name of manufacturer,
- type, designation, manufacturing date or date code,
- rated voltage (see 1.8.1 above),
- installation instructions (reference and date).