

SLOVENSKI STANDARD

SIST HD 632 S2:2009

01-marec-2009

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SIST HD 632 S1:1999

SIST HD 632 S1:1999/A1:2002

Elektroenergetski kabli z ekstrudirano izolacijo in njihov pribor za nazivne napetosti nad 36 kV (Um = 42 kV) in do 150 kV (Um = 170 kV)

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 S2:2008

ICS:

29.060.20 Kabli Cables

SIST HD 632 S2:2009 en

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HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 632 S2

November 2008

ICS 29.060.20

Supersedes HD 632 S1:1998 + A1:2002

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)

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This Harmonization Document was approved by CENELEC on 2008-10-01. 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 exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, 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: rue de Stassart 35, B - 1050 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 632 S2 on 2008-10-01.

This Harmonization Document supersedes HD 632 S1:1998 + corrigendum November 1998 and its amendment A1:2002.

By comparison with the S1 version, this full revision of HD 632:

- uses IEC 60840, Ed 3, 2004, as its Part 1;
- amends Part 2 "Additional test methods" accordingly;
- revises the particular sections in Parts 3-11 inclusive in one of three ways, namely:
 - a) by presenting a fully updated section;
 - b) by indicating only those requirements that differ from, or add to, those of Part 1;
 - c) by withdrawing the section.

The consequential parts and particular sections are listed hereafter. In respect of the particular sections in Parts 3 to 11, and by decision of the Technical Board (D68/047), National Committees need only implement 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 arrangements into Parts and Particular sections, e.g. Page 4-C-3 is page 3 of particular Section C of Part 4.

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

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

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the existence of the HD has to be announced at national level | (doa) | 2009-04-01 |
| – latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement | (dop) | 2009-10-01 |
| – latest date by which the national standards conflicting with the HD have to be withdrawn | (dow) | 2011-10-01 |
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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) – TEST METHODS AND REQUIREMENTS

1 Scope

This standard specifies test requirements for power cables with extruded insulation, of the types listed in Table 1, and their accessories, of rated voltage, U , 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.

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 the particular sections of Parts 3 to 11.

In these parts each section is either:

- 1) A full tabulation showing how the particular section either agrees, or deviates from, each clause of Part 1; or
- 2) A reduced tabulation showing only those places where the particular section deviates from Part 1.

The requirements apply to single-core cables and 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 those designed for submarine cables, for which modification to the standard tests may be necessary or special test conditions may need to be devised.

This standard does not cover transition joints between cables with extruded insulation and paper insulated cables.

2 Normative 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	Tests on cable oversheaths which have a special protective function and are applied by extrusion (IEC 60229)
EN 60230	Impulse tests on cables and their accessories (IEC 60230)
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 fibre cables – Common test methods (IEC 60811 Series)
EN 60885 (Series)	Electrical test methods for electric cables (IEC 60885 Series)

HD 588.1	High voltage test techniques - Part 1: General definitions and test requirements (Endorsing IEC 60060-1)
HD 605	Electric cables: Additional test methods
IEC 60183	Guide to selection of high voltage cables
IEC 60287-1-1:2006	Electric cables – Calculation of the current rating – Part 1: Current rating equations (100 % load factor) and calculation of losses – Section 1: General
ISO 48:1994 ¹⁾	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)

3 Definitions

For the purposes of this document, the following definitions apply.

3.1 Definitions of dimensional values (thicknesses, cross-sections, etc.)

3.1.1

nominal value

value by which a quantity is designated and which is often used in tables

NOTE Usually, in this standard, nominal values give rise to values to be checked by measurements taking into account specified tolerances.

3.1.2

median value

when several test results have been obtained and ordered in an increasing (or decreasing) succession, middle value if the number of available values is odd, and mean of the two middle values if the number is even

3.2 Definitions concerning the tests

3.2.1

routine tests

tests made by the manufacturer on each manufactured component (length of cable or accessory) to check that the component meets the specified requirements

3.2.2

sample tests

tests made by the manufacturer on samples of completed cable or components taken from a completed cable or accessory, at a specified frequency, so as to verify that the finished product meets the specified requirements

3.2.3

type tests

tests made before supplying on a general commercial basis a type of cable system or cable or accessory covered by this standard, in order to demonstrate satisfactory performance characteristics to meet the intended application. Once successfully completed, these tests need not be repeated, unless changes are made in the cable or accessory materials, or design or manufacturing process which might change the performance characteristics

¹⁾ ISO 48:1994 is superseded by ISO 48:2007.

3.2.4

electrical tests after installation

tests made to demonstrate the integrity of the cable system as installed

3.3

cable system

cable with installed accessories

3.4

nominal electrical stress

electrical stress calculated at U_0 using nominal dimensions

4 Voltage designations and materials

4.1 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.

4.2 Cable insulating materials

This standard applies to cables insulated with one of the materials listed in Table 1. It also specifies for each type of insulating compound the maximum operating conductor temperatures on which the specified test conditions are based.

4.3 Cable oversheathing materials

Tests are specified for four types of oversheath, as follows:

- ST_1 and ST_2 based on polyvinyl chloride;
- ST_3 and ST_7 based on polyethylene.

The choice of the type of oversheath depends on the design of the cable and the mechanical and thermal constraints during installation and operation.

The maximum conductor temperatures in normal operation for the different types of oversheathing materials covered by this standard are given in Table 2.

5 Precautions against water penetration in cables

When cable systems are installed in ground, easily flooded galleries or water, a radial water impermeable barrier around the cable is recommended.

NOTE A test for radial water penetration is not currently available.

Longitudinal water barriers may also be applied to avoid the need to replace long sections of cable in case of damage in the presence of water.

A test for longitudinal water penetration is given in 12.4.18.

6 Cable characteristics

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

- a) Name of manufacturer, type, designation and manufacturing date or date code.
- b) Rated voltage: values shall be given for U_0 , U , U_m (see 4.1 and 8.4).
- c) Type of conductor, its material and nominal cross-sectional area, in square millimetres. If the nominal cross-sectional area is not in accordance with EN 60228, the d.c. conductor resistance and the conductor construction shall be declared. Presence, if any, and nature of measures taken to achieve longitudinal watertightness.
- d) Material and nominal thickness of insulation (see 4.2). If the insulation is XLPE, special additives shall be declared if the higher value of $\tan \delta$ according to Table 3 is applicable.
- e) Type of manufacturing process for insulation system.
- f) Presence, if any, and nature of watertightness measures in the screening area.
- g) Material and construction of metallic screen, e.g. number and diameter of wires. The d.c. resistance of the metallic screen shall be declared. Material, construction and nominal thickness of metallic sheath, or longitudinally applied metal foil, if any.
- h) Material and nominal thickness of oversheath.
- i) Nominal diameter of the conductor (d).
- j) Nominal overall diameter of the cable (D).
- k) Inner and outer nominal diameters of the insulation.
- l) Nominal capacitance between conductor and metallic screen/sheath.

7 Accessory characteristics

For the purpose of carrying out the cable system or accessory tests described in this standard and recording the results, the accessory shall be identified. The following characteristics shall be known or declared.

- a) Cables used for testing accessories shall be correctly identified as in Clause 6.
- b) Conductor connections used within the accessories shall be correctly identified, where applicable, with respect to
 - assembly technique;
 - tooling, dies and necessary setting;
 - preparation of contact surfaces;
 - type, reference number and any other identification of the connector;
 - details of the type test approval of the connector.
- c) Accessories to be tested shall be correctly identified with respect to
 - name of manufacturer;
 - type, designation and manufacturing date or date code;
 - rated voltage (see 6 b) above);
 - installation instructions (reference and date).