

**SLOVENSKI STANDARD**  
**oSIST prHD 629.1 S3:2018**  
**01-april-2018**

---

**Preskusne zahteve za pribor, ki se uporablja na elektroenergetskih kabljih za nazivne napetosti od 3,6/6(7,2) kV do vključno 20,8/36(42) kV - 1. del: Dodatki za kable z ekstrudirano izolacijo**

Test requirements for accessories for use on power cables of rated voltage from 3,6/6 (7,2) kV up to 20,8/36(42) kV - Part 1: Accessories for cables with extruded insulation

Prüfanforderungen für Kabelgarnituren für Starkstromkabel mit einer Nennspannung von 3,6/6(7,2) kV bis 20,8/36(42) kV - Teil 1: Garnituren für Kabel mit extrudierter Kunststoffisolierung

[SIST HD 629.1 S3:2019](https://standards.iteh.ai/catalog/standards/sist/5a8d6bc5-cdfl-484b-a30f-3dfa81715fb0/sist-629.1-s3-2018)

Prescriptions relatives aux essais des accessoires des câbles d'énergie pour des tensions assignées de 3,6/6(7,2) kV à 20,8/36(42) kV - Partie 1: Accessoires pour câbles à isolation extrudée

**Ta slovenski standard je istoveten z: prHD 629.1 S3**

---

**ICS:**

29.060.20      Kabli      Cables

**oSIST prHD 629.1 S3:2018**

**en,fr,de**



HARMONIZATION DOCUMENT  
DOCUMENT D'HARMONISATION  
HARMONISIERUNGSDOKUMENT

**DRAFT**  
**prHD 629-1-S3**

February 2018

ICS 29.060.20

Will supersede HD 629.1 S2:2006

English Version

**Test requirements for accessories for use on power cables of  
rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV - Part 1:  
Accessories for cables with extruded insulation**

Prescriptions relatives aux essais des accessoires des  
câbles d'énergie pour des tensions assignées de 3,6/6(7,2)  
kV à 20,8/36(42) kV - Partie 1: Accessoires pour câbles à  
isolation extrudée

Prüfanforderungen für Kabelgarnituren für Starkstromkabel  
mit einer Nennspannung von 3,6/6(7,2) kV bis 20,8/36(42)  
kV - Teil 1: Garnituren für Kabel mit extrudierter  
Kunststoffisolierung

This draft Harmonization Document is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2018-05-04.

It has been drawn up by CLC/TC 20.

If this draft becomes a Harmonization Document, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document on a national level.

This draft Harmonization Document was established by CENELEC in three official versions (English, French, German).

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

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a Harmonization Document. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a Harmonized Document.



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**

## Contents

	Page
1 Scope .....	5
1.1 General.....	5
1.2 Type of accessories .....	5
1.3 Rated voltage .....	5
1.4 Current .....	5
2 Normative references .....	6
3 Definitions.....	6
4 Components.....	9
4.1 Connectors .....	9
4.2 Materials.....	9
5 Test assemblies .....	9
5.1 Identification .....	9
5.2 Cable conductor cross-section .....	9
5.3 Assembly.....	11
5.4 Terminations.....	11
5.5 Terminal boxes .....	11
5.6 Joints and stop ends.....	11
5.7 Separable connectors .....	11
5.8 Test arrangements and number of samples.....	12
6 Extent of compliance.....	12
6.1 General.....	12
6.2 Non range taking terminations, joints and stop ends .....	12
6.3 Range taking terminations, joints and stop ends .....	13
6.4 Terminations.....	13
6.5 Separable connectors .....	13
6.6 Connectors .....	14
6.7 Cable constructions .....	15
6.8 Three-core to single core accessory .....	15
7 Test sequences.....	16
7.1 General.....	16
7.2 Dynamic short circuit performance .....	16
8 Test results .....	16
8.1 General.....	16
8.2 Test reports .....	16
8.3 Failures .....	17
9 Visual examination.....	17
Annex A (normative) Identification of test cable .....	35
Annex B (normative) Identification of Connector .....	36
Annex C (normative) Visual examination .....	37
Annex D (informative) Examples for cross section selection .....	38
Bibliography .....	42

**Tables**

Table 1 - Compliance and qualification scheme for non range taking terminations, joints and stop ends .....	10
Table 2 – Compliance and qualification scheme for range taking terminations, joints, and stop ends .....	10
Table 3 – Test cable conductor cross-sections for separable connectors .....	12
Table 4 - Extension of compliance and qualification scheme for non range taking terminations, joints and stop ends .....	13
Table 5 – Extension of compliance and qualification scheme for range taking terminations, joints, and stop ends .....	13
Table 6 – Compliance requirements of connectors for joints and terminations .....	14
Table 7 – Compliance requirements of lugs for separable connectors .....	15
Table 8 – Range of insulation compliance .....	15
Table 9 – Extension of compliance from a three-core accessory to a single-core accessory of the same design .....	15
Table 10 – Indoor terminations for extruded insulation cables (including shrouded terminations) .....	18
Table 11 – Outdoor terminations for extruded insulation cables .....	19
Table 12 – Straight joints, branch joints and loop joints for extruded insulation cables .....	20
Table 13 – Stop ends for extruded insulation cables .....	21
Table 14 – Screened separable connectors for extruded insulation cables .....	22
Table 15 – Unscreened separable connectors (excluding shrouded terminations) for extruded insulation cables .....	23
Table 16 – Additional tests for compliance extension to other conductor connectors <sup>(1)</sup> .....	24
Table 17 – Additional tests for smallest cable cross section compliance <sup>(1)</sup> .....	25
Table 18 – Additional tests for separable connector compliance extension to largest cable cross section <sup>(1)</sup> .....	25
Table 19 – Summary of test voltages .....	26
Table D.1 Example for Outdoor Termination .....	38
Table D.2 Example for Joint .....	39
Table D.3 Example for Outdoor Termination .....	40
Table D.4 Example for Joint .....	41

**Figures**

Figure 1 – Test arrangements for non range taking terminations .....	27
Figure 2 - Test arrangements for range taking terminations .....	28
Figure 3 – Test arrangements for non range taking joints, loop joints and branch-joints .....	29
Figure 4 – Test arrangements for range taking joints, loop joints and branch-joints .....	30
Figure 5 – Test arrangements for non range taking stop ends .....	31
Figure 6 – Test arrangements for range taking stop ends .....	32
Figure 7 – Test arrangements for screened separable connectors .....	33
Figure 8 – Test arrangements for unscreened separable connectors .....	34

prHD 629.1 S3:2018 (E)

## European foreword

This document (prHD 629.1 S3:2018) has been prepared by CLC/TC 20, "Electric cables".

This document is currently submitted to the Enquiry.

The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

This document will supersede HD 629.1 S2:2006 and its amendment A1:2008.

This Harmonization Document has been written as part of a series of standards to satisfy the Public Procurement Directive, and is complementary to HD 620, which covers extruded insulation power cables from 3,6/6(7,2) kV to 20,8/36(42) kV, inclusive.

This standard defines the requirements, which may be called up for joints, stop ends, separable connectors, indoor and outdoor terminations when used with extruded insulation power cables covered by HD 620. The equivalent requirements for paper-insulated power cables are given in HD 629.2 S2.

The test methods for these accessories are given in EN 61442:2005.

<https://standards.iteh.ai/catalog/standards/sist/5a8d6bc5-cdf1-484b-a30f-3dfa81715fb0/sist-hd-629-1-s3-2019>

## 1 Scope

### 1.1 General

This document specifies performance requirements for type tests for cable accessories for use on extruded insulation power cables as specified in HD 620 or other relevant cable standards.

Once type test for an accessory is successfully completed, it is not necessary to repeat the test, unless changes are made in the materials, design or manufacturing process, which might affect the performance characteristics.

Possible extra thermo-mechanical forces due to high current loads from renewable sources of power generation are not covered by these tests (under consideration).

Accessories for special applications such as submarine cables, ship cables or hazardous situations (explosive environments, fire resistant cables or seismic conditions) are not included.

Test methods are included in EN 61442:2005.

NOTE 1: This European Standard does not invalidate existing approvals of products achieved on the basis of national standards and specifications and/or the demonstration of satisfactory service performance. However, products approved according to such national standards or specifications cannot directly claim approval to this European standard.

NOTE 2: It may be possible, subject to agreement between supplier and purchaser, and/or the relevant conformity assessment body, to demonstrate that conformity to the earlier standard can be used to claim conformity to this European Standard, provided an assessment is made of any additional type testing that may need to be carried out. Any such additional testing that is part of a sequence of testing cannot be done separately.

### 1.2 Type of accessories

The accessories covered by this standard are listed below:

- a) indoor and outdoor terminations of all designs, including terminal boxes;
- b) straight-joints, branch-joints, stop ends and loop joints of all designs, suitable for use underground, indoors or outdoors;

NOTE 1 Tests specific for UV and outdoor weather resistance are not included.

- c) screened or unscreened plug-in type or bolted-type separable connectors, capable of interfacing with bushing profiles as specified in EN 50180 and EN 50181.

NOTE 2 Joints connecting extruded insulation cables (HD 620) to paper insulated cables (HD 621) are not included. The requirements for these accessories are dealt with in HD 629.2.

### 1.3 Rated voltage

The rated voltages  $U_0/U$  ( $U_m$ ) of the accessories covered by this standard are 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) - 18/30(36) - 19/33(36) - 20,8/36(42) kV where:

$U_0$  is the rated power-frequency voltage between conductor and earth or metallic screen, for which the cable accessory is designed;

$U$  is the rated power-frequency voltage between conductors for which the cable accessory is designed;

$U_m$  is the maximum value of the 'highest system voltage' for which the cable accessory is designed.

### 1.4 Current

The continuous current rating of a termination or joint for extruded insulation power cables is in accordance with the appropriate cable specified in HD 620 or other relevant cable standards and is suitable for operation at the rated current and under short circuit fault conditions at the temperatures stated therein.

The current rating of a separable connector is governed by the current rating of the mating bushing (see EN 50180 and EN 50181).

## 2 Normative 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 50180, *Bushings above 1 kV up to 52 kV and from 250 A to 3,15 kA for liquid filled transformers*

EN 50181, *Plug-in type bushings above 1 kV up to 52 kV and from 250 A to 2.5 kA for equipment other than liquid filled transformers*

EN 61238-1, *Compression and mechanical connectors for power cables for rated voltages up to 36 kV ( $U_m = 42$  kV). Test methods and requirements*

EN 61442:2005, *Test methods for accessories for power cables with rated voltages from 6 kV ( $U_m = 7,2$  kV) up to 36 kV ( $U_m = 42$  kV)*

HD 620, *Distribution cables with extruded insulation for rated voltages from 3,6/6 (7,2) kV to 20,8/36 (42) kV*

IEC 60050-461, *International Electrotechnical Vocabulary - Chapter 461: Electric cables*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions given in IEC 60050-461 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### connector (of cable)

device for connecting a conductor to an equipment terminal or for connecting two or more conductors to each other

[SOURCE: IEC 61238-1 (IEV 461-17-03, modified)]

### 3.2

#### termination

device fitted to the end of a cable to ensure electrical connection with other parts of the system and to maintain the insulation up to the point of connection

[SOURCE: IEV 461-10-01]

### 3.3

#### indoor termination

termination intended for use where it is not exposed to either solar radiation or weathering

[SOURCE: IEV 461-10-13]

### 3.4

#### outdoor termination

termination intended for use where it is exposed to either solar radiation or weathering or both

[SOURCE: IEV 461-10-14]

### 3.5

#### terminal box

air- or compound-filled box fully enclosing a termination

[SOURCE: IEV 461-10-03, modified]



**3.6****shrouded termination**

indoor termination with additional insulation at the bushing connection and used in an air-filled terminal box

[SOURCE: IEC 461-10-21]

**3.7****joint**

accessory suitable for use underground, indoors or outdoors, which makes a connection between two or more insulated power cables to form a continuous circuit

**3.8****type I joint**

joint suitable for use where impact resistance withstand is not required

**3.9****type II joint**

joint which has impact resistance withstand in accordance with this standard

**3.10****straight-joint**

accessory making a connection between two cables to form a continuous circuit

Note 1 to entry: For types of joint see 3.8 and 3.9.

[SOURCE: IEC 461-11-01]

**3.11****branch-joint**

accessory making a connection of a branch cable to a main cable

Note 1 to entry: For types of joint see 3.8 and 3.9.

[SOURCE: IEC 461-11-17]

**3.12****stop end**

accessory providing a means of insulating the unconnected end of an energized cable

Note 1 to entry: For types of joint see 3.8 and 3.9.

[SOURCE: IEC 461-10-07, modified]

**3.13****loop joint**

accessory making an end connection between two parallel cables to form a continuous circuit constructed as a branch-joint with the single end replaced with a stop end

Note 1 to entry: For types of joint see 3.8 and 3.9.

**3.14****separable connector**

fully insulated termination permitting the connection and the disconnection of a cable to other equipment

[SOURCE: IEC 461-10-06]

prHD 629.1 S3:2018 (E)

### 3.15

#### **screened separable connector**

separable connector which has a fully screened external surface

[SOURCE: IEC 461-10-15]

### 3.16

#### **unscreened separable connector**

separable connector which does not have a screened external surface

[SOURCE: IEC 461-10-15]

### 3.17

#### **plug-in type separable connector**

separable connector in which the electrical contact is made by a sliding device

[SOURCE: IEC 461-10-17]

### 3.18

#### **bolted-type separable connector**

separable connector in which the electrical contact is made by a bolted device

[SOURCE: IEC 461-10-18]

### 3.19

#### **tracking**

progressive degradation of the surface of a solid insulating material by local discharges to form conducting or partially conducting paths

Note 1 to entry: Tracking usually occurs due to surface contamination.

[SOURCE: IEC 442-01-41]

### 3.20

#### **erosion**

wearing away of insulating material by the action of electric discharges

[SOURCE: IEC 212-11-55]

### 3.21

#### **metallic housing**

metal enclosure in intimate contact with the outer screen of a separable connector and having at least the same current carrying capacity to earth as the metallic screen of the cable with which the separable connector is to be used

### 3.22

#### **shelf life / storage life**

duration of the time interval a raw material or semi-finished product may be stored under specified conditions without changing any important properties

[SOURCE: IEC 212-13-15]

### 3.23

#### **operating eye**

integral part of an elbow or other accessory device designed for the attachment of a live-line tool used to handle or operate the device

### 3.24

#### **non range taking accessory**

accessory designed for covering only one cable cross section

### 3.25

#### **range taking accessory**

accessory designed for covering a range of cable cross sections

## 4 Components

### 4.1 Connectors

Connectors used within the accessory shall comply with EN 61238-1 class A, or with another relevant standard or specification when agreed between manufacturer/supplier. All connectors shall be identified in accordance with Annex B.

Where an accessory is to be installed with a different connector than that used for qualification, its compatibility and performance shall be verified.

Compliance is demonstrated with the connector used in the tests. For extension of compliance to other connectors refer to 6.6.

### 4.2 Materials

It is not a prerequisite for compliance with this testing standard that any component material (resin, heat-shrink tubing etc.) should be subject to any form of individual type testing or fingerprinting.

Where required, monitoring of the ongoing suitability of component material supplies should be done by fingerprinting using the EN 50655 and/or IEC 60455-3-8.

If type testing of resins, pressure sensitive adhesive tapes and flexible insulating sleeveings for electrical purposes is required, reference should be made to the relevant standards produced by IEC/TC 15, which have been adopted by CENELEC, as listed for information in the bibliography.

The term “material characterization” is sometimes used in conjunction with both type testing and fingerprinting of component materials, but it is undefined, and its use should therefore be avoided.

## 5 Test assemblies

### 5.1 Identification

#### 5.1.1 Cables

The cables used for testing should comply with HD 620 or other relevant standards and shall be identified as in Annex A.

#### 5.1.2 Connectors

Connectors used within the accessories shall be identified as in Annex B.

#### 5.1.3 Accessories

The accessory that is installed shall be within its shelf life.

Accessories to be tested shall be correctly identified with respect to

- name of manufacturer/supplier,
- type, designation, manufacturing date or code, end of shelf-life date,
- minimum and maximum nominal cross-sections, material and shape of cable conductor,
- minimum and maximum cable insulation diameters,
- connector type(s),
- rated voltage (see 1.3),
- Minimum value of  $U_0$  for separable connector screen fault current initiation,
- installation instructions (reference and date),
- list of kit contents.

The quantities and sizes of accessories and cables to be used in the different test sequences for qualification of terminations, joints and stop ends and the resulting range of conductor cross-section compliance are summarised in Table 1, Table 2, Table 4 and Table 5 and are further detailed below.

### 5.2 Cable conductor cross-section

Unless agreed differently with the manufacturer/supplier, the cross-sections of test cables shall be the following:

### 5.2.1 Non range taking terminations, joints and stop ends

For joints, terminations and stop ends, one of the following cable cross-sections shall be used: 120 mm<sup>2</sup> or 150 mm<sup>2</sup> or 185 mm<sup>2</sup> or 240 mm<sup>2</sup>.

Compliance for one type of accessory, for the range of cable cross-sections from 95 mm<sup>2</sup> to 300 mm<sup>2</sup>, shall be obtained by successfully completing all the appropriate tests of Table 10 to Table 13 of this standard on any of the cable cross-sections specified above.

NOTE Examples are provided in informative D.1.

**Table 1 — Compliance and qualification scheme for non range taking terminations, joints and stop ends**

Accessory size tested	Cable cross-section selected	Test Sequences <sup>a)</sup>	Samples	Range of cross-sections qualified
Specific for one of the conductor sizes described in 5.2.1	one of: 120 mm <sup>2</sup> 150 mm <sup>2</sup> 185 mm <sup>2</sup> 240 mm <sup>2</sup>	A1, B1, C1	4 (1- core) 2 (3- core)	95 mm <sup>2</sup> to 300 mm <sup>2</sup>
		A2, B2	3 (1- core) 1 (3- core)	
		A3	3 (1- core) 1 (3- core)	
<sup>a)</sup> Test Sequences refer to Tables 10, 11, 12 & 13				

### 5.2.2 Range taking accessories

For joints, terminations and stop ends, the behaviour of the accessory shall be tested at the limits of the accessory application range. The accessory application range shall include the cable cross-sections 120 mm<sup>2</sup> or 150 mm<sup>2</sup> or 185 mm<sup>2</sup> or 240 mm<sup>2</sup> within its range.

Tests described in sequences A1, B1, C1 of Table 10 to Table 13 shall be carried out with the minimum and maximum cable cross section of the accessory, declared by the accessory manufacturer/supplier as the range of application.

Tests described in sequence A3 of Table 10 and Table 11 shall be carried out on the maximum cable cross-section of the accessory application range, test sequences A2 & B2 of Tables 8, 9 & 10 shall be carried out on the maximum cable cross-section of the accessory application range.

NOTE Examples are provided in informative D.2.

**Table 2 — Compliance and qualification scheme for range taking terminations, joints, and stop ends**

Accessory size tested	Cable cross-section selected	Test Sequences <sup>a)</sup>	Samples	Range of cross-sections qualified
Accessory test size <sup>b)</sup> , having at least one of the conductor sizes described in 5.2.2 within its range	Min of range	A1, B1, C1	2 (1- core) 1 (3- core)	Min of range to max of range
	Max of range	A1, B1, C1	2 (1- core) 1 (3- core)	
		A2, A3, B2	3 (1- core) 1 (3- core)	
<sup>a)</sup> Test Sequences refer to Tables 10, 11, 12 & 13				
<sup>b)</sup> The accessory test size of range taking accessory should have at least one of the sizes described in 5.2.2 within its range, but the min & max does not need to be one of these values. For example, the range could be 95 mm <sup>2</sup> to 300 mm <sup>2</sup> .				

### 5.2.3 Separable connectors

For separable connectors, the conductor cross-section of the test cable shall be as defined in Table 3.

### 5.3 Assembly

Accessories shall be assembled in accordance with the manufacturer/supplier's instructions, using the components and materials supplied or specified. A joint designed for crossed cores shall be assembled with the cores crossed.

### 5.4 Terminations

Non range taking terminations shall be tested using the arrangements detailed in Figure 1.

Range taking terminations shall be tested using the arrangements detailed in Figure 2.

In all cases the number of samples shall be as defined in the appropriate figure.

### 5.5 Terminal boxes

A termination intended to be used in a metallic terminal box shall be tested in the specified terminal box, which shall conform to the relevant standards (for example EN 50464-2-2).

For practical reasons, it is permissible to carry out the tests with the terminations enclosed in a test terminal box fabricated from rigid metallic mesh or from insulating material lined with metal foil. The box shall allow humidity ingress.

The test terminal box shall be of the same shape and dimensions (e.g. creepage lengths and clearances) as the specified terminal box and be provided with conductor terminals and bushings of the type used in service. The box selected for testing should represent the minimum clearance applicable for the design to operate successfully.

When only one of the termination samples is required to be tested in the terminal box, the remote end of the test cable may be terminated by any suitable means.

### 5.6 Joints and stop ends

Joints and stop ends shall be tested to withstand a water height of 1 m (equivalent to 110 kPa).

NOTE 1 For special applications and in situations subject to a high water table or prone to flooding, this height of water may be insufficient to ensure the satisfactory performance of the moisture seals.

Where a water height of 1 m is deemed insufficient, upon agreement with the manufacture/supplier, accessories shall be tested using an increased water height of 20 m (equivalent to 300 kPa).

The water height used shall be recorded in the test report.

Testing at one water height demonstrates compliance for that water height.

Testing at both 1 m and 20 m water heights demonstrates compliance at those water heights and at all intermediate water heights.

NOTE 2 Water height can be achieved using a pressurized water tank.

Where a branch-joint is being tested, only the main cable shall carry heating current.

### 5.7 Separable connectors

Tests on separable connectors shall be performed with the separable connector installed on its mating bushing providing an interface given in EN 50180 or EN 50181.

Unscreened separable connectors shall be tested at the minimum phase-to-phase and phase-to-earth clearances recommended by the manufacturer/supplier.

The current value shall be sufficient to achieve the specified temperature of the cable conductor (see 9.1 of EN 61442:2005).