SLOVENSKI STANDARD
oSIST prEN 50393:2012

01-julij-2012

Nadomešča:
SIST EN 50393:2006

Preskusne metode in zahteve za pribor, ki se uporablja na distribucijskih kablih za naznačene napetosti 0,6/1,0 (1,2) kV

Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV

Prüfverfahren und Prüfanforderungen für die Garnituren von Verteilerkabeln mit einer Nennspannung von 0,6/1,0 (1,2) kV

Méthodes et prescriptions d'essai pour les accessoires de câbles de distribution de tension assignée 0,6/1,0 (1,2) kV

Ta slovenski standard je istoveten z: **prEN 50393:2012**

ICS:

29.120.20	Spojni elementi	Connecting devices

oSIST prEN 50393:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 50393

May 2012

ICS 29.120.20

Will supersede EN 50393:2006

English version

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This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
Deadline for CENELEC: 2012-10-12.

It has been drawn up by CLC/TC 20.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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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.

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CENELEC

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

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Foreword

This document [prEN 50393:2012] has been prepared by CLC/TC 20 "Electric cables".

This document is currently submitted to the Enquiry.

This document will supersede EN 50393:2006.

prEN 50393:2012 includes the following significant technical changes with respect to EN 50393:2006:

– in Clause 1 'Scope', the revised statement referring to 'existing approvals' has been inserted;

– in Clause 3 'Definitions', definitions of stop end types have been revised to align with those of joints, and definitions of 'rigid' and 'non-rigid' joints have been removed;

– in Clause 6 'Range of compliance', the numbers of joint and termination test samples have been increased (see also Table 6), compliance restriction and extension with regard to different cable designs have been clarified, and compliance restrictions and extensions relating to conductor connectors have been inserted and shown in a new Table 2;

– in 7.3, Table 3, joints of Type II are subject to a new test involving 9 heating cycles in water without oversheath damage (see also 8.6.2);

– in 7.3, Tables 3, 4 & 5, the footnotes referring to examination of tested accessories have been removed;

– in Clause 8 'Test methods', the AC voltage withstand test procedure has been simplified and clarified, references to 'rigid' and 'non-rigid' joints have been removed, reference to the 9 cycle test for Type II joints (Table 3) has been inserted, and requirements relating to examination of tested joints have been simplified and references to specific technologies or materials have been removed;

– Annexes B, C & D have been added to assist in full and accurate identification of test cable, accessories and connectors for inclusion in test reports.

1 Scope

This European Standard details the performance requirements and the test methods for type testing of cable accessories for use with power distribution cables of rated voltage 0,6/1,0 (1,2) kV as defined in HD 603 or other relevant cable standards.

Cable accessories covered by this European Standard include joints, stop ends and outdoor terminations for extruded solid dielectric insulated cables and transition joints between extruded solid dielectric insulated and impregnated paper insulated cables. Joints, stop ends and outdoor terminations for impregnated paper insulated cables are not included.

The service operating conditions of accessories shall be compatible with the service operating conditions of cables on which they are to be installed.

Accessories for special applications such as submarine, shipboard, explosive or seismic environments, or where specified fire performance characteristics are required, are not included.

NOTE 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.

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.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 61180-1:1994, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedures requirements (IEC 61180-1:1992)*

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

HD 603 S1:1994 + A1:1997 + A2:2003 + A3:2007, *Distribution cables of rated voltage 0,6/1 kV*

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

3 Terms and definitions

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

3.1
joint
accessory suitable for use in air or underground which makes a connection between two or more insulated power cables to form a continuous circuit

3.2
type I joint
joint where impact withstand, impulse voltage withstand and metallic screen short-circuit current withstand tests are not required

3.3
type II joint
joint tested for impact withstand but not for impulse voltage withstand or metallic screen short-circuit current withstand

3.4
type III joint
joint tested for impulse voltage withstand and metallic screen short-circuit current withstand but not for impact withstand

3.5
transition joint
accessory making a connection between cables having extruded solid dielectric insulation and impregnated paper insulation

3.6
stop end
accessory providing a means of insulating the end of an energised cable

3.7
type I stop end
stop end where impact withstand and impulse voltage withstand tests are not required

3.8
type II stop end
stop end tested for impact withstand but not for impulse voltage withstand

3.9
type III stop end
stop end tested for impulse voltage withstand but not for impact withstand

3.10
cable crutch
position at which the laid up cores of a multicore cable separate into individual cores

3.11
outdoor termination
termination intended for use where it is directly exposed to either solar radiation or weathering or both

3.12
type I termination
termination where impulse voltage withstand is not required

3.13
type II termination
termination tested for impulse voltage withstand

3.14
connector
device to connect cable conductors together

3.15
compression (crimp) connector
connector in which electrical connection is made by deformation or reshaping of the barrel around the cable conductor

3.16
mechanical connector
connector in which electrical connection is made by pressure applied using screws or bolts

3.17
multi-polar connector
connector with the facility to connect conductors of two or more phases within one body and having electrical insulation between phases

4 Components

4.1 Connectors

Conductor connectors used with joints and terminations shall comply with EN 61238-1, where applicable, or with another relevant performance standard. Connectors are considered integral components of accessories and are subject to compliance extensions and limitations detailed in 6.3.

Connectors for circumferential conductors comprising metal wires that are designed to carry neutral or induced current shall meet the electrical requirements of EN 61238-1, where applicable, or those of another relevant performance standard.

4.2 Materials

Component material characterisation (‘fingerprinting’) is not a prerequisite for compliance with this performance standard. If material characterisation is required, the relevant part of HD 631 should be used.

5 Electrical characteristics

5.1 Rated voltage

The rated voltage of the joints, stop ends and outdoor terminations shall be

$U_0/U\ (U_m)$ = 0,6/1,0 (1,2) kV

Where

- U_o is the rated power frequency voltage between phase conductor and earth or metallic screen for which the cable accessory is designed;
- U is the rated power frequency voltage between phase conductors for which the cable accessory is designed;
- U_m is the maximum value of the highest system voltage between phase conductors for which the cable accessory may be used.

5.2 Current rating

The continuous current rating of a joint or termination shall be in accordance with the appropriate cable(s) specified in HD 603 or other relevant cable standard.

6 Range of compliance

6.1 General

Compliance will be gained for a family of accessories of the same design and materials by successfully completing the appropriate test sequence in Table 3, 4 or 5 on the smallest and the largest accessory in the family. In the case of joints and outdoor terminations, the smallest and largest accessory shall each be tested with the smallest and largest specified cable conductor cross-sections (total 4 samples). Stop-ends shall be tested with the smallest and largest conductor cross-sections (2 samples).

The range of compliance will include these accessories and the intermediate sizes within the family. The number of test samples is shown in Tables 6 to 9. Successful testing with only one cable conductor cross-section shall give compliance for that cross-section only.

6.2 Cables

6.2.1 Compliance is restricted to the use of the accessories on the same cable type (construction and materials) as used in the tests, subject to the permitted extensions given in 6.2.2 to 6.2.5.

6.2.2 Compliance shall extend to the use of the accessories with cables having different conductor material or construction provided that the connectors used in the tests are compliant with 4.1 and 6.3 in respect of the cable conductors to be included in the compliance extension.

6.2.3 Compliance gained for accessories tested on cable with shaped conductors shall extend to the use of the same accessories on cables with circular conductors, subject to the restrictions of 4.1 and 6.3. The converse shall not apply.

6.2.4 Compliance shall extend to use of the accessories with cables having conductor insulation different from that of the test cables in accordance with Table 1.

Table 1 – Summary of compliance with different cable insulations

Cable insulation	Range of compliance
XLPE	XLPE, EPR, HEPR, PVC
EPR, HEPR	EPR, HEPR, PVC
PVC	PVC
Paper	Paper

6.2.5 Compliance gained for accessories tested on cable without longitudinal water-blocking shall extend to their use on water-blocked cable that is otherwise of the same design and materials. The converse shall not apply.

6.3 Connectors for joints

Compliance gained for joints shall be restricted to the use of the same conductor connectors as those used in the tests, together with other connectors meeting the requirement of 4.1 and falling within the extension limitations detailed in Table 2. The extensions permitted in Table 2 are based on geometrical considerations only and do not imply any similarity or difference in connector performance.

Table 2 – Compliance extension for conductor connectors in joints
(based on geometrical considerations)

<table>
<tr><th>Connector type used in tests</th><th>Compliance extension to connectors of the same type</th><th>Compliance extension to connectors of other types</th></tr>
<tr><td>Cylindrical shape straight connector (compression or mechanical)</td><td rowspan="5">Connectors with equal or smaller length and envelope diameter [a]</td><td>No extension</td></tr>
<tr><td>Non-cylindrical shape straight connector (compression or mechanical)</td><td>Cylindrical shape straight connectors with equal or smaller length and envelope diameter</td></tr>
<tr><td>Branch connector</td><td>No extension</td></tr>
<tr><td>Multi-polar straight connector</td><td>No extension</td></tr>
<tr><td>Multi-polar branch connector</td><td>No extension</td></tr>
<tr><td colspan="3">[a] ‘envelope diameter’ is the maximum circle diameter, with its plane perpendicular to the main cable conductor, that includes all metallic parts of the connector, including any projecting bolts.</td></tr>
</table>

6.4 Water immersion depth

The standard water immersion depth for tests on joints and stop-ends is 1 m (gauge pressure 10 kPa (0,1 bar)). For special applications and buried environments subject to a high water table or prone to flooding, this head of water may be considered insufficient to confirm the satisfactory performance of seals preventing the entry of water. In such cases, the test sequence of Tables 3 and 4 may be performed with an increased water head of 10 m (gauge pressure 100 kPa (1,0 bar)). Testing at a single water head will achieve compliance for that water head only. Testing at both 1 m and 10 m water heads will achieve compliance for those water heads and all intermediate values.

6.5 Transition joints

Compliance gained for transition joints shall extend to joints of the same design with an alternative type of solid dielectric cable provided that

– the paper insulated cable is of the same design, construction and materials as that used in the tests, and

– prior compliance has been gained for the use of the alternative solid dielectric cable in straight or branch joints as appropriate.

7 Type tests

7.1 General

Written reports on type tests proving compliance with this European Standard shall be made available by the supplier. The principal details of the test arrangements shall be given in the test report, including details of cable construction (refer to Annex B), accessory test samples (refer to Annex C) and conductor connectors (refer to Annex D). Information in the report should be supported by photographs where relevant.

The test reports shall be certified by a representative of the organisation carrying out the tests. This may be the manufacturer, supplier or a recognised certification body.

Should a cable fail beyond any part of an accessory, the test shall be declared void without discrediting the accessory. Tests may be repeated using a new accessory (reverting to the beginning of the test sequence) or alternatively by repair of the cable (continuing testing from the point of suspension).

7.2 Test samples

The number of samples required for each test sequence shall be in accordance with 6.1 and Tables 6 to 9.

Cables used for testing shall comply with HD 603 or other relevant cable standards.

Accessories shall be assembled in the manner specified in the supplier's installation instructions, using the components supplied in the kit. A joint designed for crossed cores shall be so assembled.

Neither the cable nor the accessories shall be subjected to any form of conditioning not specified in the installation instructions.

Relevant details regarding the test installation shall be recorded in the test report for future reference and to ensure repeatability of the test regime.

7.3 Sequence of tests

The test sequence shall be in the order given in Tables 3 to 5, as appropriate for the accessory being tested.