

**SLOVENSKI
STANDARD**

SIST HD 623 S1:1998

prva izdaja
februar 1998

Specification for joints, stop ends and outdoor terminations for distribution cables of rated voltage 0,6/1,0 kV

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ICS 29.120.20

Referenčna številka
SIST HD 623 S1:1998(en)

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ICS 29.120.20;29.240.20

Descriptors: Electrical power distribution, electric cable, termination, joint, physical characteristics, compliance, type test, marking

English version

**Specification for joints, stop ends and outdoor terminations
for distribution cables of rated voltage 0,6/1,0 kV**

Spécifications pour jonctions,
dérivations, bouts perdus et extrémités
extérieures, de câbles de distribution
de tension assignée 0,6/1,0 kV

Bestimmung für Muffen, Endmuffen
und Endverschlüsse für Freiluftanlagen
für Kabel mit Nennspannungen
0,6/1,0 kV

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This Harmonization Document was approved by CENELEC on 1995-11-28. 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.

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

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

Foreword

This Harmonization Document was prepared by the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as HD 623 S1 on 1995-11-28.

The following dates were fixed:

- latest date by which the existence of the HD has to be announced at national level (doa) 1996-06-01
- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 1996-12-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 1996-12-01

For products which have complied with the relevant national standard before 1996-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1997-12-01.

This HD has been written as part of a series of standards to satisfy the Public Procurement Directive, and is complementary to HD 603, which covers cables rated at 0,6/1,0 kV for use by distributors of electrical power.

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The Standard defines tests to demonstrate the minimum acceptable performance of joints, stop-ends and outdoor terminations for use with extruded solid dielectric insulated power cables of rated voltage 0,6/1,0 kV. Transition joints between extruded solid dielectric insulated and impregnated paper insulated cables are also included.

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The levels of testing detailed are in line with European practice and have taken into account the provisions of existing national standards.

Information concerning packaging and labelling is included.

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1. SCOPE

This specification details the performance requirements for joints, stop ends and outdoor terminations for cables of rated voltage 0,6/1,0 (1,2) kV as defined in HD 603.

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 are included. 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 the cable.

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

2. NORMATIVE REFERENCES

- HD 48 Impulse tests on cables and their accessories (endorsing IEC 230)
- HD 383 Conductors of insulated cables (endorsing IEC 228 and 228A)
- HD 505.1.4 Common test methods for insulating and sheathing materials of electric cables.
Part 1: Methods for general application. Section 4: Tests at low temperature
- HD 603 Distribution cables of rated voltage 0,6/1,0 kV
- HD 605 Electric cables: Additional test methods
<https://standards.iteh.ai/catalog/standards/sist/31a94279-06bd-4e20-ba52->
- HD XXX Material characterisation (under preparation)
- IEC 50(461) International electrotechnical vocabulary
Chapter 461: Electric cables
- IEC 55 Paper-insulated metal-sheathed cables for rated voltages up to 18/30kV with copper or aluminium conductors and excluding gas-pressure and oil-filled cables.
- IEC 60-1 High voltage test techniques
Part 1 General definitions and test requirements
- IEC 287 Calculation of the continuous current rating of cables (100% load factor)
- IEC 502 Extruded solid dielectric insulated power cables for rated voltages from 1kV up to 30kV

NOTE: In all cases reference to another HD or international standard implies the latest issue of that document.

3. DEFINITIONS

For the purposes of this standard the definitions given in IEC Publication 50(461) apply, together with the following:

3.1 Rigid joint

- 1) A joint which incorporates a resin encapsulant capable of being poured at ambient temperature and which cures to a solid state by an irreversible chemical reaction without the application of external heat.

OR

- 2) A joint which incorporates a non-setting encapsulant within a rigid outer box.

3.2 Non-rigid joint

A joint which incorporates polymeric tapes, heat or cold-shrinkable components or pre-moulded parts without a rigid outer box.

3.3 Armour and/or metallic screen continuity and earthing connections

Connections between the earth potential components of the cables in a joint or termination.

3.4 Heat-shrinkable components

Expanded polymeric extruded tubings or moulded parts which undergo thermally activated recovery when heated to an appropriate temperature.

3.5 Cold shrinkable components

Expanded polymeric extruded tubings or moulded parts which undergo recovery without the application of heat, e.g. by the removal of a support component.

3.6 Pre-moulded components

Pre-fabricated and shaped elastomeric components which are passed over the cable insulation to produce an interference fit.

3.7 Recovery

(a) Heat shrink materials

The thermally activated retraction of heat-shrink extruded tubing or moulded parts.

(b) Cold shrink or pre-stretched materials

The retraction of cold shrink or pre-stretched extruded tubing or moulded parts without the influence of heat.

NOTE: Recovery may be complete and unimpeded (full recovery) or may take place on to a solid substrate such as a cable core.

3.8 Transition joint

An accessory making a connection between cables having extruded solid dielectric insulation and impregnated paper insulation.

3.9 Stop end

An accessory providing a means of insulating an energised cable end.

3.10 Compression connector

A connector which is attached to a conductor by pressure-forming or reshaping the connector barrel.

3.11 Mechanical connector

A connector which is attached to a conductor by mechanical means e.g. a screw or bolt.

3.12 Outdoor termination

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

3.13 Type test

Tests required to be made before supplying a type of cable accessory covered by this HD on a general commercial basis in order to demonstrate satisfactory performance characteristics to meet the intended application. 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 accessory material, design or type of manufacturing process which might change the performance characteristics.

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4. ELECTRICAL CHARACTERISTICS

4.1 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_0 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 accessory may be used.

4.2 Current rating

The continuous current rating of a joint or outdoor termination shall be in accordance with the appropriate cable(s) specified in HD 603, and shall be suitable for operation at the temperatures stated in Table 1 for continuous duty and under short circuit conditions.

Table 1: Maximum rated conductor temperatures

Rating	Insulation type	
	Extruded solid dielectric	Impregnated Paper
Continuous	*	80°C
Short circuit	*	160°C

* For cables with extruded insulation, the maximum rated temperatures for continuous duty and short circuit duty are given in the particular section of HD 603.

In the absence of current ratings in HD 603, reference shall be made to IEC 287, or to the cable manufacturer.

5. COMPLIANCE

Joints, stop ends and outdoor terminations complying with this standard shall meet the following requirements:

5.1 General

Compliance will be gained for an accessory for a given cable type, in a range of conductor sizes, (copper and aluminium), providing the appropriate samples have successfully undergone the appropriate test sequence in table 2, 3 or 4.

The range of compliance for an accessory shall include the conductor sizes tested, together with the intermediate sizes. <http://www.bsi.com.au/catalog/standards/sist/31a94279-06bd-4e20-ba52-18c028e426b3/sist-hd-623-s1-1998>

Any successful test sequence carried out on only one cable size shall give compliance for that size of cable only.

Table 2

Test sequence for: Joints for solid extruded dielectric insulated cables, transition joints between solid extruded dielectric insulated cables and impregnated paper insulated cables voltage rating 0,6/1,0 (1,2)kV

TEST		SUB- CLAU SE NUMBER	SAMPLES			
			A2	A3	A4	A1
			B2	B3	B4	B1
Thermal stability	†	6.6.2	(x)			
Impulse at ambient temperature	†	6.6.3				(x)
A.C. voltage withstand (in air)		6.6.4				x
Insulation resistance (in air)		6.6.7				x
Impact at low temperature	†	6.6.5		(x)		
Impact at ambient temperature	†	6.6.6				(x)
A.C. Voltage withstand (Immersed)		6.6.4				x
Insulation resistance (Immersed)		6.6.7				x
Load cycling in air		6.6.8				x
Load cycling in water (Oversheath damage)		6.6.8				x
A.C. voltage withstand (Immersed)		6.6.4				x
Insulation resistance (Immersed)		6.6.7				x
Water penetration	†	6.6.9				(x)
Examination	†	6.6.12				(x)
Screen short circuit	‡	6.6.10			(x)	

† If this test is required by any National Committee it should be stated in the national edition of the standard.

‡ This test is required for joints incorporating an overall metallic screen only and is subject to agreement between the customer and the manufacturer.

Table 3

Test sequence for stop-ends on solid extruded dielectric insulated cables

Voltage rating 0,6/1,0 (1,2) kV

TEST		SUB- CLAU SE NUMBER	SAMPLES	
			C2	C1
Impulse at ambient temperature	†	6.6.3		(x)
A.C. voltage withstand (in air)		6.6.4		x
Insulation resistance (in air)		6.6.7		x
Impact at low temperature	†	6.6.5	(x)	
Impact at ambient temperature	†	6.6.6		(x)
A.C. voltage withstand (Immersed)		6.6.4		x
Insulation resistance (Immersed)		6.6.7		x
Immersion test		6.6.11		x
A.C. voltage withstand (Immersed)		6.6.4		x
Insulation resistance (Immersed)		6.6.7		x
Examination	†	6.6.12		(x)

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† If this test is required by any National Committee it should be stated in the national edition of the standard.

Table 4

Test sequence for outdoor terminations on solid extruded dielectric insulated cables

Voltage rating 0,6/1,0 (1,2) kV

TEST		TEST NUMBER	SAMPLES
			D1
Impulse at ambient temperature	†	6.6.3	(x)
A.C. voltage withstand (In air)		6.6.4	x
Insulation resistance (In air)		6.6.7	x
Load cycling in air		6.6.8	x
Load cycling (crutch immersed)		6.6.8	x
A.C. voltage withstand (Crutch immersed)		6.6.4	x
Insulation resistance (Crutch immersed)		6.6.7	x
Examination	†	6.6.12	(x)

† If this test is required by any National Committee it should be stated in the national edition of the standard.

Compliance with this standard for an accessory for a particular type of cable extends to another type of cable according to Table 5.

Table 5

Summary of compliance with different cable insulations

Cable insulation	Range of approval
XLPE	XLPE, EPR, PVC
EPR	EPR, PVC
PVC	PVC

NOTE: It should be noted that adhesion between the cable insulation and the accessories filling compound is critical for the performance of some joint designs.

Compliance obtained for a cable with one type of sheathing material shall not be extended to an otherwise identical cable incorporating a different sheathing material.

Compliance obtained by testing on a non water-blocked type of cable shall be extended to a water-blocked cable, but otherwise of the same design, the contrary shall not apply.

Joints and stop ends shall normally be designed to withstand a head of water of 1000mm. For special applications, e.g. installation in situations subject to a high water table or where prone to flooding, this head of water may be insufficient to ensure the satisfactory performance of the moisture seals. In these circumstances, a customer may specify an increased head of water, up to a maximum pressure equivalent to 2 bar gauge. Compliance for the accessory in these conditions shall be obtained by utilising the specified head of water in the following tests.

- 6.6.4 A.C. voltage withstand
- 6.6.7 Measurement of insulation resistance
- 6.6.8 Load cycling
- 6.6.11 Immersion

5.2 Joints and stop ends

Compliance for branch joints for a given range of cable sizes may be extended to straight joints and stop ends for the same range of cable sizes, if it can be shown that the construction is similar and the seals are of the same type and not inferior to those of the branch joints tested.

5.3 Transition joints

Satisfactory completion of the test sequence in Table 2, for a design of transition joint shall extend the compliance to a similar design of transition joint suitable for an alternative type of extruded solid dielectric insulated cable if the following conditions are met. The impregnated paper insulated cable side of the joint shall be identical in design. Prior compliance shall have been obtained for the alternative extruded solid dielectric insulated cable in a straight or branch joint as relevant and satisfactory performance of the moisture seals shall have been proven by examination according to sub-clause 6.6.12.

5.4 Optional Tests

The test sequences include a number of optional tests, the need for which is subject to agreement between the customer and the manufacturer. They are included to reflect the variations of practice, where considered necessary by at least one, but not the majority of countries.

6. TYPE TESTS

6.1 General

Written reports on type tests proving compliance with this standard shall be made available by the manufacturer. The major details of the test arrangements shall be given in the test report, including, for example, size of conductors, model and type of connector, minimum clearance between joint and shell.

Specification HD XXX shall be used to identify the profile of properties of the main components of the accessory.

[NOTE: HD XXX 'Materials characterisation' is under preparation.]

The test reports shall be signed by a representative of the body carrying out the tests. This may be the manufacturer 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 (start testing from the beginning again) or alternatively by repair of the cable (continue testing from the point of failure). <https://standards.iteh.ai/catalog/standards/sist/31a94279-06bd-4e20-ba52-18c028e426b3/sist-hd-623-s1-1998>

6.2 Test samples

The number of samples required for each test sequence shall be in accordance with Tables 6a to 6d.

Cables used for testing shall comply with HD 603 and shall be identified in the test report with respect to:

- rated voltage;
- material, shape and cross-section of conductors;
- details of construction (insulation and sheath, number of cores, water-blocking etc.);
- principal dimensions of cable.

The connecting components used in a joint or termination shall comply with the appropriate specification.

Accessories to be tested shall be correctly identified with respect to:

- name of manufacturer;
- type, designation, manufacturing date or date code;