SLOVENSKI STANDARD
SIST EN 50483-3:2009

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Zahteve za preskušanje pribora za nizkonapetostne izolirane nadzemne kable - 3. del: Zatezne in nosilne sponke za sisteme z nosilnim nevtralnim vodnikom

Test requirements for low voltage aerial bundled cable accessories -- Part 3: Tension and suspension clamps for neutral messenger system

Prüfanforderungen für Bauteile für isolierte Niederspannungsfreileitungen – Teil 3: Abspann- und Tragklemmen für Systeme mit Nullleiter-Tragseil

Prescriptions relatives aux essais des accessoires pour réseaux aériens basse tension torsadés -- Partie 3: Matériels d'ancrage et de suspension pour réseaux aériens en conducteurs isolés torsadés avec neutre porteur

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English version

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CENELEC

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

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

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Foreword

This European Standard was prepared by a sub-group of WG 11 of 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 EN 50483-3 on 2008-12-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-12-01

This is Part 3 of CENELEC standard EN 50483 "*Test requirements for low voltage aerial bundled cable accessories*", which has six parts:

– Part 1: Generalities;

– Part 2: Tension and suspension clamps for self supporting system;

– Part 3: Tension and suspension clamps for neutral messenger system;

– Part 4: Connectors;

– Part 5: Electrical ageing test;

– Part 6: Environmental testing.

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1 Scope

EN 50483 series applies to overhead line fittings for tensioning, supporting and connecting aerial bundled cables (ABC) of rated voltage U_0/U (U_m): 0,6/1 (1,2) kV.

This Part 3 applies to tensioning devices consisting of tension and suspension clamps, and tension and suspension assemblies used for the installation of ABC with either insulated or bare neutral messenger.

The tension and suspension clamps are designed to be installed on neutral conductors of ABC defined in HD 626.

Tests described in this document are type tests.

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 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 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 50483 series, *Test requirements for low voltage aerial bundled cable accessories*

HD 626 S1:1996, *Overhead distribution cables of rated voltage $U_o/U(U_m)$: 0,6/1 (1,2) kV*

IEC 60050-461, *International Electrotechnical Vocabulary (IEV) – Part 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
aerial bundled cable (ABC)
aerial cable consisting of a group of insulated conductors which are twisted together including, or not, a non insulated conductor
[IEV 461-08-02, modified]

NOTE The terms bundled conductors, bundled cables, bundled cores, conductor bundles and bundle could be used as equivalent to the term aerial bundled cable (ABC).

3.2
aerial-insulated-cable
insulated cable designed to be suspended overhead and outdoors
[IEV 461-08-01]

3.3
angle of deviation
complementary angle to the angle defined by the two parts of the cable on both sides of the suspension clamp

3.4
clamp bolt
bolt which tightens two parts of a clamp together

3.5
conductor insulation
insulation applied on a conductor
[IEV 461-02-02, modified]

3.6
conductor (of a cable)
part of a cable which has the specific function of carrying current
[IEV 461-01-01]

3.7
core
assembly comprising conductor and its own insulation
[IEV 461-04-04, modified]

3.8
fixture (or fitting)
device for attaching ABC tension or/and suspension clamps to a pole or to a wall

3.9
insulation (of a cable)
insulating materials incorporated in a cable with the specific function of withstanding voltage
[IEV 461-02-01]

3.10
messenger
wire or rope, the primary function of which is to support the cable in aerial installations, which may be separate from or integral with the cable it supports
[IEV 461-08-03]

3.11
minimum breaking load (MBL)
minimum breaking load of the conductor given by HD 626 or the cable manufacturer if not defined in the standard or minimum breaking load of the clamp given by the clamp manufacturer

3.12
mobile link
device linking the suspension clamp to the fixture

3.13
neutral messenger system
aerial insulated system where only the neutral messenger supports the ABC

3.14
sheath
uniform and continuous tubular covering of metallic or non metallic material, generally extruded
[IEV 461-05-03]

3.15
suspension clamp
device which attaches an aerial insulated cable to a fixture in order to carry its weight and any specified loading
[IEV 461-18-02, modified]

3.16
suspension or tension assembly
clamp with mobile link, or not, and associated fixture

3.17
tension clamp
device which firmly attaches an aerial insulated cable to a fixture and is designed to transmit the specified mechanical tension in the cable or messenger to the supporting structure
[IEV 461-18-01, modified]

3.18
type test
test required to be made before supplying a type of material covered by this standard on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE These tests are of such a nature that, after they have been made, they need not be repeated unless changes are made to the accessory materials, design or type of manufacturing process which might change the performance characteristics.

4 Symbols

g_2 slippage after 2 cycles

g_{15} slippage after 15 cycles

g_{250} slippage after 250 cycles

g_{500} slippage after 500 cycles

d diameter of core

α maximum angle (°) of deviation of a suspension clamp as recommended by the manufacturer or specified by the customer

5 Characteristics

These fittings shall be capable of supporting the tensile loads applied to the ABC for which they are designed, referring to the neutral messenger specified MBL, in accordance with the following tests.

Tension and suspension equipment shall be designed to avoid any direct or accidental contact between any phase conductor and metallic parts of the clamp.

6 Marking

See Clause 6 of EN 50483-1.

7 General test conditions

See Clause 9 of EN 50483-1.

7.1 Mechanical tests

See Clause 9 of EN 50483-1.

NOTE Where an assembly is to be tested, each bracket should be secured in accordance with the manufacturer's installation instructions.

7.2 Temperature

See Clause 9 of EN 50483-1.

8 Type tests

Each clamp shall be tested for the smallest and largest messenger size except for environmental tests where only the largest size is used.

8.1 Type tests for tension clamps

The following type tests shall be carried out.

Test	Applicability	Subclause
Tensile test at ambient temperature	insulated and bare neutral messenger	8.1.1
Tensile test at high temperature	insulated neutral messenger only	8.1.2
Tensile test at low temperature	insulated neutral messenger only	8.1.3
Environmental tests	insulated and bare neutral messenger	8.1.4
Clamp bolt tightening test	common for both suspension and tension clamps	8.2.1

If a cable breaks beyond any part of the tension clamp, the test result shall be declared void without discrediting the tension clamp. Tests shall be repeated using a new tension clamp and a new cable.

In order to find the possible cause of the failure, the test shall be repeated with a reference tension clamp as specified in HD 626 S1:1996, Part 2, 2.3.1.

NOTE When agreed between the manufacturer and the customer, the mechanical test loads may be defined by the smallest cable for the clamp but in this case the clamp may only be considered to conform to this standard for the smaller cable size.

8.1.1 Tensile test at ambient temperature (and breaking load test)

8.1.1.1 Principle

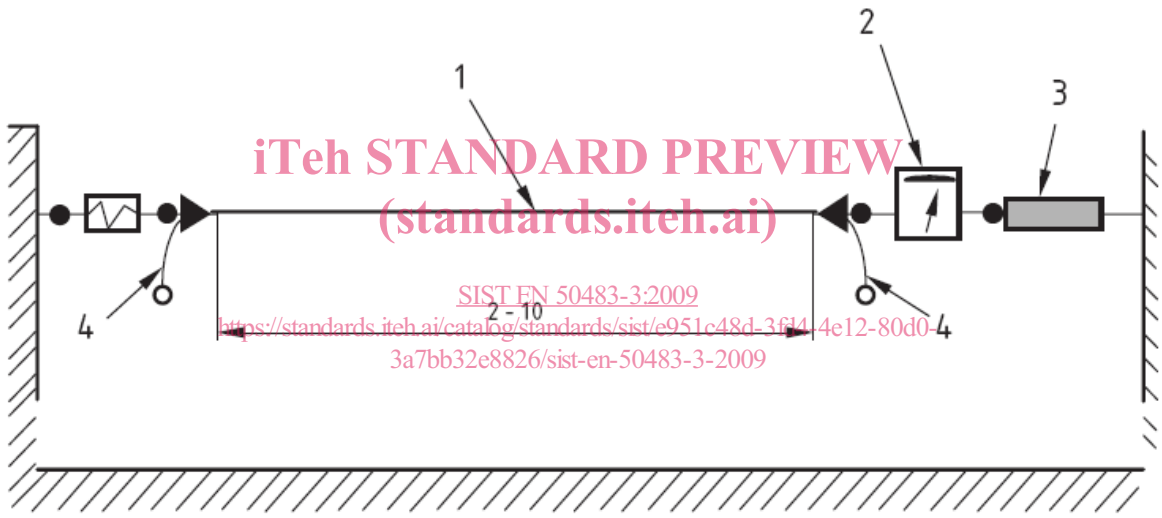
The tension clamps shall be subjected to high mechanical loads at ambient temperature in order to ensure that they are capable of sustaining loads likely to be encountered in service without being damaged or damaging the conductor.

The test shall be carried out for the maximum and minimum insulated neutral messenger cross-section, for which the clamp is designed.

8.1.1.2 Test arrangement

Figure 1 shows a typical test arrangement. The test configuration can differ from this arrangement as long as it complies with the neutral messenger lengths.

Dimensions in metres



Key

1	neutral messenger	◀	tension clamp
2	mechanical load measurement device	●	mechanical junction allowing rotation
3	tensioning device	○	current source connection
4	minimum 1 m	⏦	mechanical tension adjustment

Figure 1 – Test arrangement

8.1.1.3 Procedure

For the maximum and minimum neutral messenger cross-sections, for which the clamp is designed, a tension clamp shall be installed at a minimum of 1 m from the end of the cable sample. The tension clamp shall be secured to a device similar to the one used for its attachment to the support. At the other end, which is not stripped for insulated messenger, an appropriate tension device shall be attached to the neutral messenger by means of a tension clamp or other appropriate device.

NOTE A different distance between the clamps (from 2 m to 10 m), may be agreed between the manufacturer and the customer.

A load shall be applied and increased until it reaches 80 % of MBL of the messenger. The load shall then be reduced to 20 % of MBL of the messenger.

The neutral messenger shall then be marked where it leaves the clamp so that any slippage can be seen with respect to the clamp.

The load shall then be increased to 90 % of MBL of the messenger for both insulated and bare neutral messenger. This load shall be maintained for 60 s.

The speed of load application is defined in EN 50483-1, 9.1.4.

8.1.1.4 Requirements

The clamp shall not slip by more than 10 mm with respect to the mark on the neutral messenger.

No damage shall occur which could affect the correct function of the tension clamp.

NOTE When agreed between the customer and the manufacturer, an additional test may be carried out as follows. The previous test arrangement should be used again with a new tension clamp and the messenger should be replaced with a steel wire of cross section equivalent to the neutral messenger. The assembly should be subjected to an increasing load until the clamp breaks or the load reaches 110 % of the MBL of the messenger. When a breaking occurs, the load at which the breaking occurs should be recorded. For practical reason, to avoid any slippage between steel wire and clamp, fixed stops may be used.

8.1.2 Tensile test at high temperature

8.1.2.1 Principle

The purpose of this test is to ensure that the tension clamp does not slip excessively on the insulated neutral messenger during service and that any movement does not damage the insulation. It combines heat cycles with mechanical load.

8.1.2.2 Test arrangement

Figure 1 shows a typical test arrangement. The test configuration may differ from this arrangement as long as it complies with the neutral messenger lengths.

The test shall be carried out for the maximum and minimum insulated neutral messenger cross-section, for which the clamp is designed.

8.1.2.3 Procedure

Tension clamps and the neutral messenger shall be subjected to this test, which comprises of 500 cycles, of 90 min each in which a heat cycle is combined with mechanical loads.

A tension clamp shall be fitted 1 m from both ends of the section of neutral messenger. The distance between the clamps shall be at least 2 m.

NOTE 1 A different distance between the clamps (from 2 m to 10 m) may be agreed between the manufacturer and the customer.

Before starting the first cycle the neutral messenger shall be subjected to 10 % of its MBL and the sheath shall be marked so that any slippage can be measured with respect to the clamp.

An alternating current shall be passed through the neutral messenger until its temperature rises to (60 ± 3) °C. The temperature rise shall be achieved within 15 min and then maintained at this temperature for the next 30 min or until the total time is 45 min if the temperature is achieved more quickly.

The temperature of the neutral messenger shall be measured underneath the insulation with a thermocouple.

NOTE 2 For further information on thermocouple application, see EN 50483-5, 5.4.1.

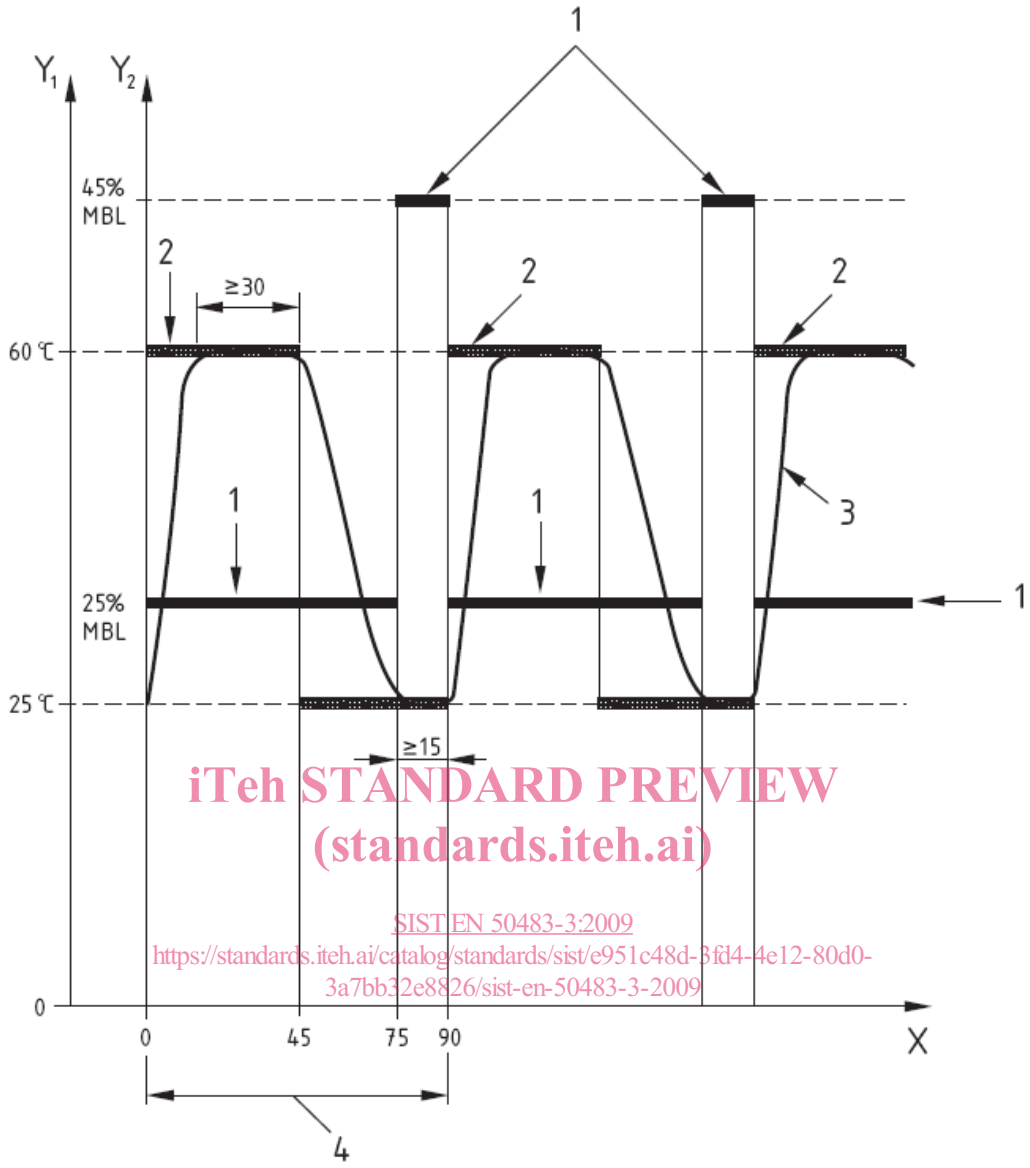
The temperature can be measured at a position that is not under mechanical tension. The measuring position shall be at least 1 m from the clamp and the end of the neutral messenger. It shall also be at the same horizontal level as the clamp in order to avoid any difference in air temperature.

The neutral messenger shall be allowed to cool to (25 ± 3) °C during the next 30 min. This temperature shall be maintained for the next 15 min until the end of the cycle.

A mechanical load of 25 % of the MBL of the neutral messenger shall be applied, and maintained, for the first 75 min of the cycle. During the last 15 min once the neutral messenger has cooled to 25 °C, the load shall be increased to 45 % of the MBL of the neutral messenger. This increase in load shall be gradually applied in not less than 5 s and not more than 60 s.

If accelerated cooling is used, it shall act on the whole of the loop, and use air within ambient temperature limits.

The cycle and the theoretical temperature profile are shown diagrammatically in Figure 2.



Key

1	selected value of mechanical load	*X*	time in minutes
2	selected value of temperature	Y_1	temperature in °C
3	temperature profile	Y_2	mechanical load in % of MBL of the neutral messenger
4	one cycle		

Figure 2 – Cycle and temperature profile

8.1.2.4 Requirements

8.1.2.4.1 Slippage checking

The neutral messenger sheath slippage with regard to the clamp shall comply with the following conditions:

- slippage after 2 cycles: $g_2 \leq 4$ mm;
- slippage after 500 cycles: $g_{500} \leq 5$ mm.