BS EN 50483-1:2009

BSI British Standards

Test requirements for low voltage aerial bundled cable accessories —

Part 1: Generalities

raising standards worldwide™

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 50483-1:2009.

The UK participation in its preparation was entrusted by Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/11, Cable accessories.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 56177 1

ICS 29.240.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2009

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50483-1

January 2009

ICS 29.240.20

English version

Test requirements for low voltage aerial bundled cable accessories - Part 1: Generalities

Prescriptions relatives aux essais des accessoires pour réseaux aériens basse tension torsadés - Partie 1: Généralités

Prüfanforderungen für Bauteile für isolierte Niederspannungsfreileitungen - Teil 1: Allgemeines

This European Standard was approved by CENELEC on 2008-12-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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: avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 50483-1:2009 E

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 50483-1 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 1 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.

_____

Contents

Tables

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.

The objective is to provide a method of testing the suitability of accessories when used under normal operating conditions with low voltage aerial bundled cables (ABC) complying with HD 626.

There is variation between the different ABC specifications provided by HD 626, and tests carried out on one of the ABC types may not be completely applicable to ABC of a different specification. Therefore, the purchasers of accessories tested to this European Standard, must ensure that all their requirements are met.

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.

Climate differs across Europe and in order to meet the differing geographic climatic conditions it is necessary to provide a range of tests to meet these variations. A range of optional, additional tests is provided to meet the varying climatic needs and these should be agreed between the customer and the supplier (see Annex C in EN 50483-6).

The purpose of this Part 1 is to define the common aspects of the products included in the above scope.

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 50182:2001, *Conductors for overhead lines – Round wire concentric lay stranded conductors*

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

EN 60068-1:1994, *Environmental testing – Part 1: General and guidance* (IEC 60068-1:1988 + corrigendum Oct. 1988 + A1:1992)

EN 61238-1:2003, *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 61238-1:2003, mod.)

EN ISO 9001:2008, *Quality management systems – Requirements* (ISO 9001:2008)

HD 626, *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
adiabatic
occurring with no addition or loss of heat from the system under consideration

3.2
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).

3.3
aerial-insulated-cable
insulated cable designed to be suspended overhead and outdoors
[IEV 461-08-01]

3.4
angle of deviation
complementary angle to the angle defined by the two parts of the cable on both sides of the suspension clamp

3.5
branch connector
metallic device for connecting a branch conductor to a main conductor at an intermediate point on the latter
[IEV 461-17-05]

3.6
branch conductor
conductor connected to the main conductor by a connector

3.7
clamp bolt
bolt which tightens two parts of a clamp together

3.8
conductor insulation
insulation applied on a conductor
[IEV 461-02-02, modified]

3.9
conductor (of a cable)
part of a cable which has the specific function of carrying current
[IEV 461-01-01]

3.10
connector
metallic device to connect cable conductors together
[IEV 461-17-03]

3.11
core
assembly comprising conductor and its own insulation
[IEV 461-04-04, modified]

3.12
equalizer
arrangement used in the test loop to ensure a point of equipotential in a stranded conductor
[EN 61238-1:2003, 3.8]

3.13
fixture (or fitting)
device for attaching ABC tension or/and suspension clamps to a pole or to a wall

3.14
insulation (of a cable)
insulating materials incorporated in a cable with the specific function of withstanding voltage
[IEV 461-02-01]

3.15
insulation piercing connector (IPC)
connector in which electrical contact with the conductor is made by metallic protrusions which pierce the insulation of the ABC core
[IEV 461-11-08, modified]

3.16
median connector
connector which during the first heat cycle records the third highest temperature of the six connectors in the test loop
[EN 61238-1:2003, 3.11]

3.17
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]

3.18
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

3.19
mobile link
device linking the suspension clamp to the fixture

3.20
neutral messenger system
aerial insulated system where only the neutral messenger supports the ABC

3.21
pre-insulated (terminal) lug
insulated metallic device for connecting an insulated cable conductor to other electrical equipment

3.22
pre-insulated through connector (sleeve)
insulated metallic device for connecting two consecutive lengths of insulated conductors

3.23
rated tensile strength (RTS)
estimate of the conductor breaking load calculated using the specified tensile properties of the component wires
[EN 50182:2001, 3.7]

3.24
recycling code
mark(s), on a product, which identifies(y) the constituent material(s) of the product

3.25
reference conductor
length of conductor(s) without any joints, which is included in the test loop and which enables the reference temperature and reference resistance(s) to be determined
[EN 61238-1:2003, 3.7, modified]

3.26
reusable connector
connector for connecting ABC to stripped cable or bare conductor where only the branch connection can be reused

3.27
routine test
test made on all accessories to demonstrate their integrity

3.28
sample test
test made on samples of a product or components taken from a product adequate to verify that the finished product meets the design specifications

3.29
self supporting system
aerial insulated system where all the cores of the ABC contribute to its support

3.30
sheath
uniform and continuous tubular covering of metallic or non metallic material, generally extruded
[IEV 461-05-03]

3.31
shear head
head of a bolt, or a device fitted over the head of a bolt or a nut, which is designed to break at a specified torque

3.32
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]

3.33
suspension or tension assembly
clamp with mobile link, or not, and associated fixture

3.34
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]

3.35
traceability code
mark(s), on a product, which gives information about its manufacture and year of production

3.36
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

A list of symbols is available with each part of the standard where applicable.

5 Products concerned

This European Standard applies to the following products:

– tension and suspension clamps for low voltage ABC self supporting system. The type tests are defined in EN 50483-2;

– tension and suspension clamps for low voltage ABC supporting system with neutral messenger. The type tests are defined in the EN 50483-3;

– connectors including insulation piercing connectors (IPC), pre-insulated lugs and through connectors (sleeves) for low voltage ABC systems. The type tests are defined in EN 50483-4.

NOTE Diagrams show a representation of fittings only and do not indicate any preference of design.

Some type tests are common to several products and have been published under specific standards:

– heat cycling test under EN 50483-5;

– environmental tests under EN 50483-6.

6 Marking

All products mentioned above shall permanently bear:

– manufacturer’s trade mark or logo;

– product code or reference;

– traceability code / batch number;

– the minimum and maximum cross section for which the unit is suitable;

– tightening torque or die reference, if applicable;

– recycling code, if any.

NOTE Other specific markings should be agreed between customer and manufacturer.

A test for marking is provided in 9.2.

7 Quality procedure

In order to claim compliance with this European Standard, products covered within the series EN 50483 shall be submitted to all the relevant tests defined in Annexes A and B, and meet the relevant requirements. The manufacturer shall provide the results of the tests in writing.

8 Routine and sample tests

Compliance of the supplied products shall be established by presenting the results of the tests listed in Annex A.

8.1 Checking compliance of the supplied products

8.1.1 With a quality assurance system

Within this system, the quality plan specific to the product shall specify the procedure of the tests to be carried out and their frequency.

This plan shall be made by the manufacturer and given to the customer as a part of the contractual relationship involving the Quality Assurance. The standard model of Quality Management Systems to be adopted by the manufacturer is described in EN ISO 9001:2008 standard.

8.1.2 Without quality assurance system

These tests shall be carried out on randomly sampled items from each supplied batch according to a standard or procedure jointly determined by the manufacturer and the purchaser.

It is assumed that these tests are representative of the whole batch.

8.1.2.1 Tests and inspection

The manufacturer or supplier shall, as a minimum, establish and maintain documented procedures for inspection and testing activities in order to verify that the specified requirements are met. The required inspection and testing procedures shall be provided in writing.

8.1.2.1.1 Receiving inspection and testing

The manufacturer shall ensure that incoming products are not used or processed until they have been inspected or otherwise verified as conforming to specified requirements. Verification of conformance to the specified requirements shall be in accordance with the quality plan and/or documented procedures.

In determining the amount and nature of receiving inspection, consideration shall be given to the amount of control at the subcontractor's premises and the recorded evidence of conformance provided.

8.1.2.1.2 In-process inspection and testing

The manufacturer shall

a) inspect and test the product as required by the quality plan and/or documented procedure,

b) hold product until the required inspection and tests have been completed or necessary reports have been received and verified.

8.2 Final inspection and testing

The supplier shall carry out all final inspection and testing in accordance with the quality plan and/or documented procedures to complete the evidence of conformance of the finished product to the specified requirements.

The quality plan and/or documented procedures for final inspection and testing shall require that all specified inspection and tests, including those specified either on receipt of product or in process, have been carried out and that the results meet the specified requirements.

No product shall be dispatched until all activities specified in the quality plan and/or documented procedures have been satisfactorily completed and the associated data and documentation are available and authorized.

8.3 Inspection and test records

The supplier shall establish and maintain records which provide that the products have been inspected and/or tested. The results shall show clearly whether the product has passed or failed the inspection and/or test, documented procedures for control of non conforming product shall apply.

Records shall identify the inspection authority responsible for the release of product.

9 Type tests

9.1 General test conditions

For all the type tests described in the standard, the following test conditions apply except where different conditions are specified to meet the requirements of particular type tests.

For application in areas of very low temperature, the use of -10 °C may be inadequate. In such cases, upon agreement between manufacturer and customer, the product may be tested using a lower temperature. The chosen temperature shall be recorded in the test report.

New insulated cores or cables shall be used.

The same core of a cable cross section (e.g. Phase 1), shall be used for the whole test.

Insulated cores shall be conditioned beforehand. The purpose of this treatment is to ensure the dimensional stabilisation of the insulating sheath. The core sections shall be kept, in an enclosure at (30 ± 2) K above the conductor normal operating temperature indicated in the table of Annex C for approximately 1 h and letting them cool down naturally to ambient temperature.

9.1.1 Frequency

The applicable power frequency shall be in the range 49 Hz to 61 Hz.

9.1.2 Ambient temperature

Unless otherwise specified, tests shall be carried out in a room whose ambient temperature ranges between +15 °C and +30 °C in accordance with EN 60068-1:1994, 5.3.

9.1.3 Load

The applicable tolerance for any applied mechanical load shall be within ± 5 %.

9.1.4 Speed of load application

For all mechanical tests, the load increase shall be carried out smoothly with a tension machine and the rate of the load increase shall be between 5 000 N/min and 7 500 N/min for mechanical accessories and 1 000 N/min to 5 000 N/min for connectors.

9.1.5 Leakage current for dielectric voltage test

The maximum leakage current shall be equal to 10 mA ± 0,5 mA.

9.1.6 Water resistivity

The resistivity of the water for dielectrical voltage test in immersion shall be ≤ 200 Ωm (normally tap water will meet this requirement). The water shall be at ambient temperature.

9.1.7 Speed of voltage application

During dielectric voltage test, an increasing a.c. voltage is applied at a rate of approximately 1 kV/s.

9.1.8 Torque meter

A torque meter shall be used for all tightening operation. It shall have a resolution at least of 0,1 Nm and an accuracy better than or equal to 4 %.

9.1.9 Humidity conditions

Unless otherwise specified, tests shall be carried out in a room whose relative humidity ranges between 25 % and 75 % in accordance with EN 60068-1:1994, 5.3.

9.1.10 Torque application

Where the tightening of a nut, or a bolt, requires a specific rate of application, the tightening shall be carried out at a rate of approximately 1 full turn in 8 s, or at the rate specified in the manufacturer's installation instructions.

NOTE Initial tightening may be carried out without the use of tools until the nut, or bolt, cannot be further tightened using the fingers and thumb of one hand.

9.1.11 Temperature range

Unless otherwise specified, temperature ranges shall be ± 3 K from the specified value.

9.1.12 Test loads

Where it is available, in HD 626, the MBL of the cable shall be used for all tests. Where MBL is not available, one of the methods provided in HD 626 shall be used to determine the MBL.

9.2 Test for permanent marking

9.2.1 Principle

This test ensures that the marking of accessories is readable and durable.

9.2.2 Test arrangement

The number of samples to be tested is defined in Annex B.

9.2.3 Procedure

The marking shall be rubbed by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

NOTE Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0,1 % by volume, a kauri-butanol value of 29, initial boiling point of 65 °C, a dry point of 69 °C and a specific gravity of 0,68 g/cm³.

9.2.4 Requirement

The marking shall remain clear and allow the accessory to be easily identified.

9.3 Tests and sample selection

Annex B provides a table of the tests and number of samples required for each product. It shows four classes of testing which corresponds to:

– Class A: connector subjected to heat cycles and short-circuit tests,

– Class B: connector subjected to heat cycles only,

– Class 1: connector subjected to dielectric test in water,

– Class 2: connector subjected to dielectric test in air.

9.4 Test reports

The following information shall be recorded in the test report.

Conductor and insulation:

- conductor material;
- nominal cross-section area, number of wires, dimensions and shape. It is recommended that the actual cross-sectional area should also be given;
- material and thickness of insulation when applicable;
- diameter of the core;
- the HD 626 conductor reference.

Connectors, accessories and tooling:

- the assembly technique that is used;
- tooling, dies and necessary setting;
- preparation of contact surfaces, if applicable;
- torque when applicable;
- type, reference number, batch number, and any other identification of the connector;
- connector class;

- in the case of insulation piercing connectors, installation temperature.

For the electrical ageing test:

- connector class;
- current at equilibrium temperature;
- for Class A, the short-circuit parameters and test arrangement;
- Direct Current value for resistance measurements.

Test apparatus:

- accuracy of test apparatus which have a direct effect on the test results.

Test results:

- test results with, where appropriate, the units of measurement.

The test report shall identify whether the tests are optional or additional.

Annex A
(normative)

List of tests for compliance

Table A.1 – Selective table for type tests, sample tests and routine tests

Test	Piercing connectors			Preinsulated sleeves and lugs			Suspension clamps self supporting system			Tension clamps self supporting system			Suspension clamps neutral messenger system			Tension clamps neutral messenger system		
	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests
Visual examination	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dimensional and material verification	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Corrosion ageing test	x			x			x			x			x			x		
Climatic ageing test	x			x			x			x			x			x		
Test for permanent marking	x	x		x	x		x	x		x	x		x	x		x	x	
Tensile test at ambient temperature and breaking load test							x	x		x	x		x	x		x	x	
Slip test at high temperature (optional)							x						x					
Slip test at low temperature										x						x		
Slip test at ambient temperature							x						x					
Bolt tightening test	x	x					x	x		x	x		x	x		x	x	
Low temperature assembly test	x			x														

Table A.1 - Selective table for type tests, sample tests and routine tests *(continued)*

	Piercing connectors			Preinsulated sleeves and lugs			Suspension clamps self supporting system			Tension clamps self supporting system			Suspension clamps neutral messenger system			Tension clamps neutral messenger system		
Test	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests	Type Tests	Sample Tests	Routine Tests
Test for mechanical damage to conductors	x	x																
Branch cable pull-out test	x	x																
Shear head function test	x																	
Low temperature impact test	x																	
Mechanical testing				x														
Electrical ageing test	x			x														
Dielectrical voltage test	x	x		x	x		x			x			x			x		
Tensile test at high temperature / Thermal test							x			x						x		
Swing test (optional)													x					
Endurance test under mechanical and thermal stresses				x														

NOTE A selection of the sample tests may be carried out with agreement between the customer and the manufacturer.

Annex B
(normative)

Test selection – Samples needed for type tests

Table B.1 – Tension clamps for self supporting system – EN 50483-2

Clause	Test											
6	**Test for permanent marking**										J(2)	
8.1.1 & 8.2.1	**Tensile test at ambient temperature**	A1(2)							H3(2)	I3(2)		
8.1.2 & 8.2.2	**Breaking load test**		B(2)			E2(2)	F2(2)	G2(2)				
8.1.3 & 8.2.5	**Tensile test at high temperature/Thermal test**			C1(2)								
8.1.4	**Tensile test at low temperature**				D(2)							
8.2.3	**Slip test at ambient temperature**											
8.2.4	**Slip test at high temperature (optional)**											
8.4	**Clamp bolt tightening test**											K(2)
8.3.1	**Dielectrical voltage test in air (clamp)**	A2(2)		C2(2)					H2(2)	I2(2)		
8.3.2	**Dielectrical voltage test in water (conductor)**	A3(2)		C3(2)								
8.5.1.1	**Corrosion – Salt mist test**					E1(2)						
8.5.1.2.1	**Corrosion – Gas atmosphere test (Method 1)**						F1(2)					
8.5.1.2.2	**Corrosion – Gas atmosphere test (Method 2)**							G1(2)				
8.5.2.1	**Climatic ageing test (Method 1)**								H1(2)			
8.5.2.2	**Climatic ageing test (Method 2)**									I1(2)		

Ai(n), ……. Zi(n) A to Z : samplings taken from a batch

i : test sequence

n : number of samples to be tested

Table B.2 – Suspension clamps for self supporting system – EN 50483-2

Clause	Test											
6	**Test for permanent marking**											K(2)
8.1.1 & 8.2.1	**Tensile test at ambient temperature**	A1(2)								I3(2)	J3(2)	
8.1.2 & 8.2.2	**Breaking load test**						F2(2)	G2(2)	H2(2)			
8.1.3 & 8.2.5	**Tensile test at high temperature/Thermal test**				D1(2)							
8.1.4	**Tensile test at low temperature**											
8.2.3	**Slip test at ambient temperature**		B1(2)									
8.2.4	**Slip test at high temperature (optional)**			C(1)								
8.4	**Clamp bolt tightening test**					E(2)						
8.3.1	**Dielectrical voltage test in air (clamp)**	A2(2)	B2(2)		D2(2)					I2(2)	J2(2)	
8.3.2	**Dielectrical voltage test in water (conductor)**	A3(2)	B3(2)		D3(2)							
8.5.1.1	**Corrosion – Salt mist test**						F1(2)					
8.5.1.2.1	**Corrosion – Gas atmosphere test (Method 1)**							G1(2)				
8.5.1.2.2	**Corrosion – Gas atmosphere test (Method 2)**								H1(2)			
8.5.2.1	**Climatic ageing test (Method 1)**									I1(2)		
8.5.2.2	**Climatic ageing test (Method 2)**										J1(2)	

Ai(n), ……. Zi(n) A to Z : samplings taken from a batch
i : test sequence
n : number of samples to be tested

Table B.3 – Tension clamps for neutral messenger – EN 50483-3

Clause	Test											
6	**Test for permanent marking**											K(2)
8.1.1 & 8.2.2.1	**Tensile test at ambient temperature and breaking load test**	A(2+2)			D2(2)	E2(2)	F2(2)	G3(2)	H3(2)			
8.1.2	**Tensile test at high temperature**		B1(2+2)									
8.1.3	**Tensile test at low temperature**			C1(2+2)								
8.2.2.2	**Slip test at ambient temperature**											
8.2.6	**Slip test at high temperature (optional)**											
8.2.1	**Clamp bolt tightening test**										J(1+1)	
8.2.5	**Swing test (optional)**											
8.1.5.1	**Dielectrical voltage test in air (clamp)**									I(1)		
8.1.5.2 & 8.2.4.1	**Dielectrical voltage test in air (clamp and conductor)**							G2(2)	H2(2)			
8.1.5.3 & 8.2.4.2	**Dielectrical voltage test in water (clamp and conductor)**		B2(2+2)	C2(2+2)								
8.1.4.2 & 8.2.3.2	**Corrosion – Salt mist test**				D1(2)							
8.1.4.3.1 & 8.2.3.3.1	**Corrosion – Gas atmosphere test (Method 1)**					E1(2)						
8.1.4.3.2 & 8.2.3.3.2	**Corrosion – Gas atmosphere test (Method 2)**						F1(2)					
8.1.4.4.1 & 8.2.3.4.1	**Climatic ageing test (Method 1)**							G1(2)				
8.1.4.4.2 & 8.2.3.4.2	**Climatic ageing test (Method 2)**								H1(2)			

Ai(n), ... Zi(n)

A to Z : samplings taken from a batch

i : test sequence

n : number of samples to be tested

Table B.4 – Suspension clamps for neutral messenger – EN 50483-3

Clause	Test														
6	**Test for permanent marking**														N(2)
8.1.1 & 8.2.2.1	**Tensile test at ambient temperature and breaking load test**	A(1)						G2(2)	H2(2)	I2(2)	J3(2)	K3(2)			
8.1.2	**Tensile test at high temperature**														
8.1.3	**Tensile test at low temperature**														
8.2.2.2	**Slip test at ambient temperature**		B(1+1)												
8.2.6	**Slip test at high temperature (optional)**			C1(1+1)											
8.2.1	**Clamp bolt tightening test**													M(1+1)	
8.2.5	**Swing test (optional)**				D2(2)	E2(2)	F2(2)								
8.1.5.1	**Dielectrical voltage test in air (clamp)**														
8.1.5.2 & 8.2.4.1	**Dielectrical voltage test in air (clamp and conductor)**										J2(2)	K2(2)	L(1)		
8.1.5.3 & 8.2.4.2	**Dielectrical voltage test in water (clamp/connector and conductor)**			C2(1+1)	D3(2)	E3(2)	F3(2)								
8.1.4.2 & 8.2.3.2	**Corrosion – Salt mist test**							G1(2)							
8.1.4.3.1 & 8.2.3.3.1	**Corrosion – Gas atmosphere test (Method 1)**						F1(2)		H1(2)						
8.1.4.3.2 & 8.2.3.3.2	**Corrosion – Gas atmosphere test (Method 2)**									I1(2)					
8.1.4.4.1 & 8.2.3.4.1	**Climatic ageing test (Method 1)**				D1(2)						J1(2)				
8.1.4.4.2 & 8.2.3.4.2	**Climatic ageing test (Method 2)**					E1(2)						K1(2)			

Ai(n), ……. Zi(n) A to Z : samplings taken from a batch
i : test sequence
n : number of samples to be tested

Table B.5 – Insulation piercing connectors (IPC) – EN 50483-4

Clause	Test																			
6	**Test for permanent marking**																		S (2)	
8.1.3.1.3.1	**Dielectrical voltage test in water**						F (2+2)										P3[a] (2+2)	Q3 (2+2)		
8.1.3.1.3.2.1	**Dielectrical voltage test in air (Method 1)**							G (2+2)									P2 (2+2)	Q2 (2+2)		
8.1.3.1.3.2.2	**Dielectrical voltage test in air (Method 2)**								H (2+2)											
8.1.3.2	**Water tightness test**									I (2+2)									R2 (2+2)		T2 (2+2)
8.1.5.1.3.1	**Corrosion – Salt mist test**											K (2)	L1 (2)							
8.1.5.1.3.2	**Corrosion – Gas atmosphere test (Method 1)**												L2 (2)							
8.1.5.1.3.2	**Corrosion – Gas atmosphere test (Method 2)**													M (2)						
8.1.5.1.3.3	**Immersion test (Method 1)**														N (6+6)					
8.1.5.1.3.3	**Immersion test (Method 2)**															O[b] (2)				
8.1.5.2.3.1	**Climatic ageing test (Method 1)**															O (2)	P1 (2+2)		R1 (2+2)	
8.1.5.2.3.2	**Climatic ageing test (Method 2)**																	Q1 (2+2)		T1 (2+2)

Table B.5 – Insulation piercing connectors (IPC) – EN 50483-4 *(continued)*

Clause	Test																				
8.1.2.1	**Test for mechanical damage to the main conductor**	A (2+2+2)																			
8.1.2.2	**Branch cable pull-out test**		B (2+2)																		
8.1.2.3	**Connector bolt tightening test**			C (2+2+2)																	
8.1.4	**Low temperature assembly test**										J (2+2+2)										
8.1.2.4	**Shear head function test**				D (12+12)																
8.1.2.5	**Low temperature impact test**					E (2+2)															
8.1.6	**Electrical ageing test**																			S (6+6)	

Ai(n), ……. Zi(n)

A to Z : samplings taken from a batch

i : test sequence

n : number of samples to be tested

[a] For Class 1 only.

[b] This test is included in Climatic Ageing test (Method 1).

Table B.6 – Preinsulated sleeves – EN 50483-4

Clause	Test										
6	**Test for permanent marking**										J(2)
8.2.2 & 8.3.2	**Mechanical testing**	A(2)			D3(2)					I4(4)	
8.2.3.1.3.2	**Dielectrical voltage test in air (Class 2)**			C(2)			F2(2)	G2(2)		I2(4)	
8.2.3.1.3.1	**Dielectrical voltage test in water (Class 1)**		B(2)		D2(2)		F3(2)[a]	G3(2)[a]		I3(4)[a]	
8.3.3	**Water tightness test (lugs)**										
8.2.5.1 & 8.3.5.2	**Corrosion ageing test**					E(2)					
8.3.5.3	**Bi-metallic corrosion test in sodium hydroxide (NaOH) solution**										
8.2.5.2.3.1 & 8.3.5.1.3.1	**Climatic ageing test (Method 1)**						F1(2)				
8.2.5.2.3.2 & 8.3.5.1.3.2	**Climatic ageing test (Method 2)**							G1(2)			
8.2.4 & 8.3.4	**Low temperature assembly test**				D1(2)						
8.2.6 & 8.3.6	**Electrical ageing test**								H(6)		
8.2.7	**Endurance test under mechanical and thermal stresses**									I1(4)	

Ai(n), ... Zi(n)

A to Z : samplings taken from a batch

i : test sequence

n : number of samples to be tested

[a] For Class 1 only.

Table B.7 – Preinsulated lugs – EN 50483-4

Clause	Test									
6	**Test for permanent marking**									J(2)
8.2.2 & 8.3.2	**Mechanical testing**	A(2)		C2(2)						
8.2.3.1.3.2	**Dielectrical voltage test in air (Class 2)**									
8.2.3.1.3.1	**Dielectrical voltage test in water (Class 1)**									
8.3.3	**Water tightness test (lugs)**		B(2)		D2(2)	E2(2)				
8.2.5.1 & 8.3.5.2	**Corrosion ageing test**						F(2)			
8.3.5.3	**Bi-metallic corrosion test in sodium hydroxyde (NaOH) solution**							G(2)		
8.2.5.2.3.1 & 8.3.5.1.3.1	**Climatic ageing test (Method 1)**				D1(2)					
8.2.5.2.3.2 & 8.3.5.1.3.2	**Climatic ageing test (Method 2)**					E1(2)				
8.2.4 & 8.3.4	**Low temperature assembly test**			C1(2)						
8.2.6 & 8.3.6	**Electrical ageing test**								H(6)	
8.2.7	**Endurance test under mechanical and thermal stresses**									

Ai(n), ... Zi(n)

A to Z : samplings taken from a batch

i : test sequence

n : number of samples to be tested

Annex C
(informative)

Highest rated temperatures of insulating compounds

(extracted from HD 626)

Cable type	Insulating material	Normal operation	Short circuit
Part 3 - Section A Type 3A-1	PE Type TIP-1	70 °C	120 °C
Part 3 - Section C Types 3C-1 and 3C-2	PE Type TIP-2	65 °C	100 °C
Part 3 - Section I Type 3I-1	PE Type TIP-5	70 °C	135 °C
Part 3 - Section L Type 3L-1	PE Type TIP-4	65 °C	100 °C
Part 4 - Section B Type 4B-1 (aluminium conductors) Type 4B-2 (copper conductors)	XLPE Type TIX-1	90 °C	250 °C
Part 4 - Section E Type 4E-1	XLPE Type TIX-5	90 °C	250 °C
Part 4 - Section F Type 4F-1	XLPE Type TIX-2	80 °C	130 °C
Part 4 - Section G Type 4G-1	XLPE Type TIX-6	80 °C	130 °C
Part 4 - Section J Type 4J-1 (aluminium conductors) Type 4J-2 (copper conductors)	XLPE Type TIX-8	90 °C	250 °C
Part 4 - Section K Type 4K-1	XLPE Type TIX-3	90 °C	250 °C
Part 4 - Section M Type 4M-1	XLPE Type TIX-9	75 °C	250 °C
Part 4 - Section N Type 4N-1	XLPE Type TIX-5	90 °C	250 °C
Part 5 - Section D Type 5D-1	PE Type TIP-3	70 °C	135 °C
Part 5 - Section I Type 5I-1	PE Type TIP-5	70 °C	135 °C
Part 6 - Section B Type 6B-1	XLPE Type TIX-1	90 °C	250 °C
Part 6 - Section D Type 6D-1	XLPE Type TIX-4	90 °C	250 °C
Part 6 - Section E Type 6E-1	XLPE Type TIX-5	90 °C	250 °C
Part 6 - Section J Type 6J-1	XLPE Type TIX-8	90 °C	250 °C
Part 6 - Section K Type 6K-1	XLPE Type TIX-3	90 °C	250 °C
Part 6 - Section N Type 6N-1	XLPE Type TIX-5	90 °C	250 °C
Part 7 - Section H Type 7H-1	XLPE Type TIX-7	75 °C	160 °C
Part 8 - Section H Type 8H-1	XLPE Phases (black) XLPE Neutral (grey) Type TIX-7	Phase 85 °C Neutral 65 °C	Phase 250 °C Neutral 180 °C
In the absence of temperatures in this table, reference shall be made to the cable manufacturer.			

Bibliography

EN 61284:1997, *Overhead lines – Requirements and tests for fittings* (IEC 61284:1997)

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level.

It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.

Tel: +44 (0)20 8996 9000 Fax: +44 (0)20 8996 7400

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

You may also buy directly using a debit/credit card from the BSI Shop on the website **www.bsigroup.com/shop**

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library.

Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.

Tel: +44 (0)20 8996 7111
Fax: +44 (0)20 8996 7048 Email: info@bsigroup.com

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about BSI is available on the BSI website at **www.bsigroup.com**

Copyright

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™

British Standards