

INTERNATIONAL STANDARD

IEC 61442

Second edition
2005-03

**Test methods for accessories for
power cables with rated voltages
from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)**

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IEC 61442:2005

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TEST METHODS FOR ACCESSORIES
FOR POWER CABLES WITH RATED VOLTAGES
FROM 6 kV ($U_m = 7,2$ kV) UP TO 30 kV ($U_m = 36$ kV)**

FOREWORD

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International Standard IEC 61442 has been prepared by IEC technical committee 20: Electric cables.

This second edition of IEC 61442 cancels and replaces the first edition of IEC 61442, published in 1997, and constitutes a technical revision.

Significant technical changes with respect to the previous edition are as follows:

- a) a test in water has been added for stop ends;
- b) the heating cycles voltage test has been revised to clarify testing in air and water;
- c) the testing conditions for the short-circuit tests have been redefined;
- d) additional information has been provided for testing separable connectors with a metallic housing;

- e) tests not required by IEC, i.e. an immersion test for outdoor terminations and an impact test, have been included in order to have a common test method document with CENELEC under the IEC/CLC Dresden agreement.

The text of this standard is based on the following documents:

FDIS	Report on voting
20/748/FDIS	20/762/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
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WITHDRAWN

TEST METHODS FOR ACCESSORIES FOR POWER CABLES WITH RATED VOLTAGES FROM 6 kV ($U_m = 7,2$ kV) UP TO 30 kV ($U_m = 36$ kV)

1 Scope

This International Standard specifies the test methods to be used for type testing accessories for power cables with rated voltage from 3,6/6 (7,2) kV up to 18/30 (36) kV. Test methods are specified for accessories for extruded and paper insulated cables according to IEC 60502-2 and IEC 60055-1 respectively.

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 amendments) applies.

IEC 60055-1: *Paper-insulated metal-sheathed cables for rated voltages up to 18/30 kV (with copper or aluminium conductors and excluding gas-pressure and oil-filled cables) – Part 1: Tests on cables and their accessories*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60230:1966, *Impulse tests on cables and their accessories*

IEC 60270:2000, *High-voltage test techniques – Partial discharge measurements*

IEC 60502-2:2005, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV ($U_m = 1,2$ kV) up to 30 kV ($U_m = 36$ kV) – Part 2: Cables for rated voltages from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)*

IEC 60811-1-2:1985, *Common test methods for insulating and sheathing materials of electric and optical cables – Part 1: Methods for general application – Section Two: Thermal ageing methods*

IEC 60885-3:1988, *Electrical test methods for electric cables – Part 3: Test methods for partial discharge measurements on lengths of extruded power cables*

IEC 60986:2000, *Short-circuit temperature limits of electric cables with rated voltages from 6 kV ($U_m = 7,2$ kV) up to 30 kV ($U_m = 36$ kV)*

IEC 61238-1:2003, *Compression and mechanical connectors for power cables for rated voltages up to 30 kV ($U_m = 36$ kV) – Part 1: Test methods and requirements*

3 Test installations and conditions

- 3.1** The test methods described in this standard are intended to be used for type tests.
- 3.2** Test arrangements and the number of test samples are given in the relevant standard.
- 3.3** The test conditions are specified in Clauses 4 to 20 of this standard. When they are not, they shall be as specified in the relevant standards.
- 3.4** Unless otherwise stated, the testing parameters and the requirements are given in the relevant standard.
- 3.5** For transition joints (either extruded insulation to extruded insulation or extruded insulation to paper insulation), the testing parameters (voltage and conductor temperature) are those for the lower rated cable.
- 3.6** The tests shall be started not less than 24 h after the installation of the accessories on the cable test loops, unless otherwise specified by the manufacturer. The time interval shall be recorded in the test report.
- 3.7** Cable screens, and armour if any, shall be bonded and earthed at one end only to prevent circulating currents.
- 3.8** All parts of an accessory which are normally earthed shall be connected to the cable screen. Any supporting metalwork shall also be earthed.
- 3.9** Ambient temperature shall be $(20 \pm 15) ^\circ\text{C}$.
- 3.10** Tap water shall be used for all tests in water.

4 AC voltage tests

4.1 Dry test for all accessories

4.1.1 Installation

The set(s) of accessories shall be erected with all associated metalwork and fittings. The accessories shall be clean and dry before applying the test voltage.

4.1.2 Method

Unless otherwise specified, the test shall be made at ambient temperature, and the procedure for voltage application shall be as specified in Section 5 of IEC 60060-1.

4.2 Wet test for outdoor terminations

4.2.1 Installation

The terminations shall be erected in a vertical position, unless they are to be specifically installed in another orientation, with the relative spacing as under service conditions and according to manufacturer's instructions.

4.2.2 Method

Unless otherwise specified, the wet test method is as described in 9.1 of IEC 60060-1, and shall be carried out at ambient temperature.

4.3 Test in water for stop ends

4.3.1 Installation

The stop ends shall be installed in a water tank of such dimensions as to have a height of water of $1,00^{+0,02}_0$ m over their top surface, unless otherwise specified. The water shall be at ambient temperature.

4.3.2 Method

Unless otherwise specified, the procedure for voltage application shall be as specified in IEC 60060-1.

5 DC voltage tests

5.1 Installation

The set(s) of accessories shall be erected with all associated metalwork and fittings. The accessories shall be clean and dry before applying the test voltage.

5.2 Method

A voltage of negative polarity shall be applied to the cable conductor.

The test shall be made at ambient temperature and the procedure for voltage application shall be as specified in Section 4 of IEC 60060-1.

6 Impulse voltage tests

6.1 Installation

For preparation of the test installation, involving metal enclosures and terminal boxes, reference shall be made to the relevant standard.

In the case of three-core accessories (such as three single-core terminations in an enclosure), one phase shall be tested at a time, with the other two phases earthed.

6.2 Method

The test shall be conducted according to the procedure given in IEC 60230 (Clause 3 and following).

6.3 Test at elevated temperature

Installation and the measurement of temperature are given in Clause 8 of this standard.

The cable conductor shall be heated and stabilized for at least 2 h at a temperature of

- 5 K to 10 K above the maximum cable conductor temperature in normal operation for extruded insulation cables,

- 0 K to 5 K above the maximum cable conductor temperature in normal operation for paper insulated cables,

before and during the impulse test.

7 Partial discharge test

This test is only required for accessories for extruded insulation single-core cables and three-core cables with individually semi-conducting screened cores. It is not required for accessories incorporating paper insulated cables.

7.1 Method

The test shall be conducted in accordance with IEC 60270 and IEC 60885-3.

The partial discharge shall be measured at the test voltage given in the relevant standard.

7.2 Test at elevated temperature

Installation and measurement of temperature are given in Clause 8 of this standard.

The cable conductor shall be heated and stabilized for at least 2 h at a temperature of 5 K to 10 K above the maximum cable conductor temperature in normal operation, before and during the partial discharge test.

8 Tests at elevated temperature

8.1 Installation and connection

The accessories shall be erected, supported where necessary and provided with connections to permit heating current to be circulated.

Where terminations or separable connectors are to be tested, the connection between either lugs or bushings shall have an electrical cross-section equivalent to that of the cable conductor.

Where branch joints are to be tested, only the main cable shall carry the heating current.

Three-core accessories may be connected for either single-phase or three-phase heating current. Single-phase or three-phase voltage in accordance with requirements shall be superimposed on the heating current. In the case of a magnetic covering, a three-phase heating current shall be applied.

Accessories for belted cables shall be subjected to three-phase voltage.

8.2 Measurement of temperature

8.2.1 Cable conductor temperature

It is recommended that one of the methods described in Annex A is used to determine the actual conductor temperature.