

Test methods for accessories for power cables with rated voltages from 6 kV ($U_m = 7,2 \text{ kV}$) up to 36 kV ($U_m = 42 \text{ kV}$)

The European Standard EN 61442:2005 has the status of a
British Standard

ICS 19.080; 290.060.20

National foreword

This British Standard is the official English language version of EN 61442:2005. It was derived by CENELEC from IEC 61442:2005. Together with BS EN 50393 (due for publication during 2005) it partially supersedes BS 7888-2:1998 which will be withdrawn on 1 July 2006.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags [C] [C]. Where a common modification has been introduced by amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by [C11] [C11].

The UK participation in its preparation was entrusted by Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/11, Cable accessories, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 31 and a back cover.

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**Test methods for accessories for power cables with rated voltages
from 6 kV ($U_m = 7,2$ kV) up to 36 kV ($U_m = 42$ kV)
(IEC 61442:2005, modified)**

Méthodes d'essais des accessoires
de câbles d'énergie de tensions
assignées de 6 kV ($U_m = 7,2$ kV)
à 36 kV ($U_m = 42$ kV)
(CEI 61442:2005, modifiée)

Prüfverfahren für
Starkstromkabelgarnituren mit einer
Nennspannung von 6 kV ($U_m = 7,2$ kV)
bis 36 kV ($U_m = 42$ kV)
(IEC 61442:2005, modifiziert)

This European Standard was approved by CENELEC on 2005-03-01. 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The text of document 20/748/FDIS, future edition 2 of IEC 61442, prepared by IEC TC 20, Electric cables, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61442 on 2005-03-01.

A draft amendment, prepared by the Technical Committee CENELEC TC 20, Electric cables, was submitted to the formal vote and was approved by CENELEC for inclusion into EN 61442 on 2005-03-01.

This European Standard supersedes HD 628 S1:1996 + A1:2001.

In comparison with HD 628, the impact test at low temperature has been deleted.

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) | 2006-01-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2008-03-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61442:2005 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

Title

Amend the title to show the following upper voltage limit:

“... with rated voltages from 6 kV ($U_m = 7,2$ kV) up to 36 kV ($U_m = 42$ kV)”

1 Scope

Amend the voltage reference in paragraph 1 to read:

“... with rated voltages from 6 kV ($U_m = 7,2$ kV) up to 36 kV ($U_m = 42$ kV), ...”

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TEST METHODS FOR ACCESSORIES FOR POWER CABLES WITH RATED VOLTAGES FROM 6 kV ($U_m = 7,2$ kV) UP TO 36 kV ($U_m = 42$ kV)

1 Scope

This International Standard specifies the test methods to be used for type testing accessories for power cables with rated voltages from IEC 60055-1 6 kV ($U_m = 7,2$ kV) up to 36 kV ($U_m = 42$ kV). IEC 60502-2 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.

8.2.2 Thermocouple position

If method 2 of Annex A is used to determine the conductor temperature, two thermocouples shall be attached to the cable sheath as shown in Figures 1 to 6.

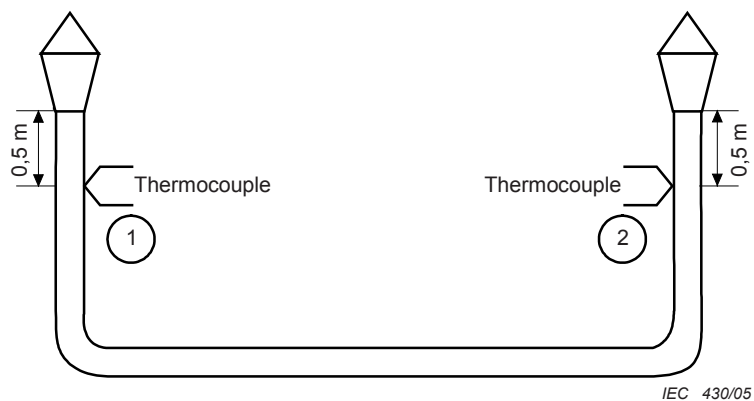


Figure 1 – Terminations tested in air

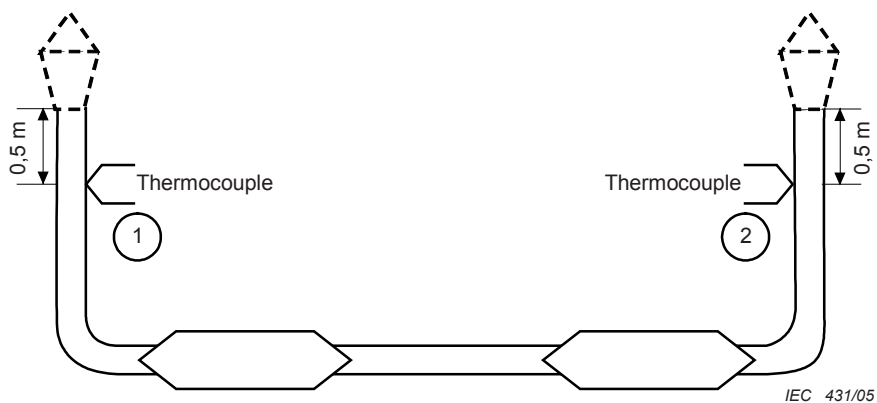


Figure 2 – Joints tested in air