BS EN 50699:2020

BSI Standards Publication

Recurrent Tests of Electrical Equipment

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National foreword

This British Standard is the UK implementation of EN 50699:2020.

The UK participation in its preparation was entrusted to Technical Committee L/1, Electrotechnical Technical Policy Committee.

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

The UK committee draws to the attention of the user that certain test methodologies within this standard are not aligned with the requirements specified in a number of product safety standards. As such, the testing in this standard could result in erroneous safety test results and possibly damage the equipment. If there is any question as to the validity of the test method within this standard, reference should be made to the relevant product safety standard.

Additionally, attention is drawn to the fact that some product safety standards specify that insulation resistance shall be tested with a voltage of 250 V DC, even though the exemption from testing at 500 V in Table 1 does not apply (see Subclause 5.4, which states: 'The value of the test voltage shall not be below 500 V DC except for equipment with embedded overvoltage suppressors, in this case the test voltage shall be reduced to 250 V DC.').

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

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EUROPÄISCHE NORM

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English Version

Recurrent Test of Electrical Equipment

Essais récurrents des appareils électriques

Wiederholungsprüfung für elektrische Geräte

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

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European foreword

This document (EN 50699:2020) has been prepared by CLC/BTTF 160-1 “Recurrent Test of Electrical Equipment”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2021-09-21
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2023-09-21

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Introduction

This document intends to provide a uniform test procedure to test the effectiveness of the protective measures for electrical safety for recurrent tests of current-using equipment and appliances during their operating life time at work places.

This document can be considered by employers to support compliance with the European Directive 2009/104/EC concerning the minimum safety and health requirements for the use of work equipment by workers at work and does not necessarily involve the manufacturer.

In general, test procedures for verification of products is the responsibility of the related product technical committees. This document can be taken into consideration by product technical committees if they need to take into consideration modified or additional tests for verification of products falling within their scope.”

The described tests are simple and fast, well approved and safe for the testing person.

They can be carried out on site and/or in laboratories.

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1 Scope

This document specifies the requirements of the test procedures to be applied for recurrent tests of current-using electrical equipment and appliances for the verification of the effectiveness of the protective measures and the permissible limits

This procedure is applicable to current-using electrical equipment connected at work places to final circuits with a rated voltage above 25 V AC and 60 V DC up to 1 000 V AC and 1 500 V DC, and currents up to 63 A. They can be either pluggable equipment type A connected to final circuits at work places via a plug or permanently connected equipment.

This document assumes that the current-using equipment or appliances under consideration complies with its related product standard, has been introduced on the market and is in use.

This document does not cover:

— tests after repair defined in EN 50678;

— type tests, routine tests, sample tests, special tests and acceptance tests for product safety nor for product functional requirements.

NOTE 1 type tests, routine tests, sample tests, special tests and acceptance tests are usually defined in product standards. This document does not replace tests covered by product standards.

This document does not apply to:

— devices and equipment that are part of the fixed electrical installations defined in HD 60364 (all parts);

NOTE 2 For these devices, tests for initial and periodic verifications are covered by HD 60364-6.

— uninterruptible Power Supply (UPS), photovoltaic inverters and power converters, e.g. AC/DC converters;

— charging stations for electro-mobility;

— stationary power supplies (generators);

— programmable Logic Controllers (PLC);

— power Drives;

— devices for EX-zones or for mining applications in general;

— products already covered by standards addressing similar topics such as:

a) medical equipment covered by EN 60601-1. For these devices, EN 62353 applies;

b) arc welding equipment covered by EN 60974-1. For these devices, EN 60974-4 applies;

c) machinery covered by EN 60204-1. For these devices, EN 60204-1 applies.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61557-1, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 1: General requirements*

EN 61557-2, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 2: Insulation resistance*

EN 61557-4, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 4: Resistance of earth connection and equipotential bonding*

EN 61557-16, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 16: Equipment for testing the effectiveness of the protective measures of electrical equipment and/or medical electrical equipment*

IEC 60417, *Graphical symbols for use on equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

NOTE Some of the definitions are different from those in the product standards for type testing, as different measuring methods are used.

3.1
electrical safety
protection within a piece of equipment which limits the effects of electrical current on a user or other individuals

Note 1 to entry: Safety is defined as freedom from unacceptable risk (refer to ISO 14971:2007, definition 2.24).

3.2
testing
process of visually controlling, measuring or proving the electrical equipment in order to assure that equipment remains safe to use

3.3
electrically skilled person
skilled person
person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create

[SOURCE: IEV 195-04-01]

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3.4
electrically instructed person
instructed person
person adequately advised or supervised by electrically skilled persons to enable him or her to perceive risks and to avoid hazards which electricity can create

[SOURCE: IEV, 195-04-02]

3.5
electrical equipment
single apparatus using electrical energy and connected by plug or permanently connected to a final circuit of the distribution system

Note 1 to entry: Equipment includes those accessories as defined by the manufacturer that are necessary to enable the normal use of the equipment.

3.6
final circuit
electric circuit intended to directly supply electric current to current-using equipment or socket-outlets

[SOURCE: IEV 826-14-03 modified, buildings is removed]

3.7
leakage current
current flowing from live parts of the equipment to earth

[SOURCE: IEV 442-01-24 modified – the term has changed and a reference to the absence of an insulation fault has been removed.]

3.8
touch current
current passing through a human or animal body when it touches one or more accessible parts of a piece of electrical equipment not connected to protective earth

[SOURCE: IEV 195-05-21 modified – the wording of the definition has been narrowed]

3.9
protective conductor current
electric current which flows in a protective conductor and is frequency weighted according to the characteristics of the human body

[SOURCE: IEV 826-11-21, modified – the wording of the definition has been expanded.]

3.10
residual current
vectorial sum of the currents flowing in the live conductors of the mains circuit of the equipment and frequency weighted according to the characteristics of the human body

[SOURCE: IEV 826-11-19 modified – the wording of the definition has been expanded]

3.11
insulation resistance
resistance under specified conditions between two conductive elements separated by insulating materials

[SOURCE: IEV 151-15-43]

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3.12
protective bonding resistance
resistance between any accessible conductive part, which is connected for safety purposes to the protective earth terminal, and the

— protective terminal of the mains plug, or

— protective terminal of the equipment inlet, or

— protective terminal permanently connected to the supply mains;

3.13
SELV
electric system in which the voltage cannot exceed the value of extra-low voltage:

— under normal conditions, and

— under single fault conditions, including earth faults in other electric circuits

Note 1 to entry: SELV is the abbreviation for safety extra-low voltage.

[SOURCE: IEV 826-12-31]

3.14
PELV
electric system in which the voltage cannot exceed the value of extra-low voltage:

— under normal conditions, and

— under single fault conditions, except earth faults in other electric circuits

Note 1 to entry: PELV is the abbreviation for protective extra-low voltage.

[SOURCE: IEV 826-12-32]

3.15
recurrent test
periodic verification of the effectiveness of protective measures of electrical equipment

3.16
permanently connected equipment
equipment that can only be electrically connected to or disconnected from the mains by the use of a tool

3.17
pluggable equipment type A
equipment that is intended for connection to the mains via a non-industrial plug and socket outlet or via a non-industrial appliance coupler, or both

Note 1 to entry: Examples are appliance couplers covered by standards such as EN 60320-1.

3.18
current-using equipment
electrical equipment intended to convert electrical energy into another form of energy, for example light, heat, mechanical energy

[SOURCE: IEC 60050-826:2004, 826-16-02]

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3.19
hazardous live parts
live part which, under certain conditions, can give a harmful electric shock

[SOURCE: IEC 60050-826:2004, 826-12-13]

4 Requirements

Recurrent tests shall be performed by an electrically skilled person or by an electrically instructed person, supervised by an electrically skilled person. Additional requirements (e.g. for the mechanical safety or for fire protection) according to the requirements from the product safety standard may be taken into account.

If it is not possible to perform a certain test step, an electrically skilled person shall decide if the safety of the equipment under test can be confirmed without the test step or by other means. This decision shall be justified and reported.

If testing the equipment requires additional knowledge or additional test equipment, for example equipment for microwaves, tests shall be done according to the instructions of the manufacturer.

All tests shall be performed in such a manner that the risk for testing personnel or other individuals shall be reduced by appropriate protective measures.

If not otherwise stated, all values for current and voltage are the r.m.s. values of an alternating, direct or composite voltage or current.

The applicable tests as listed in Clause 5 shall be used to advise that:

— there are no visible faults on safety related parts, which are accessible by the user and

— by the intended use of the equipment, minimized hazard for the user or the environment originates.

The electrically skilled person who is responsible for the test shall decide if additional tests are required to meet the protective measures.

During a recurrent test the equipment shall not be disassembled. The electrically skilled person may decide that, for equipment that is connected to the distribution system with fixed and protected wiring and is not intended to be hand-held during operation, the test is carried out according to this document and/or according to the relevant clauses of HD 60364-6.

The test procedure shall be interrupted and the equipment shall be disconnected from mains and marked as failed, if it is found that during the test:

— reduced safety levels are present due to damage or from unintended use;

and/or

— functional hazards could occur.

NOTE The frequency of testing can be determined by the national requirements or recommendation of the manufacturer. Where no national requirements or information of the manufacturer is existing a risk analysis can be used.

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5 Tests

5.1 General

5.1.1 General test conditions

The tests may be performed at the ambient temperature, humidity and atmospheric pressure present at the location of testing.

If it is obvious that the equipment is contaminated by dust or moisture, it is allowed to clean the equipment under test and/or to allow it to dry before starting the tests

The operational limits of the test equipment and the equipment under test shall be taken into account.

The equipment shall be tested according to the test steps in 5.1.1 to 5.1.5, as long as it is possible with the equipment under test. The sequence of testing shall be as defined in this document.

Each individual performed test shall be passed before proceeding to the next test.

If it is not possible to perform a certain test step, an electrically skilled person shall decide if the safety of the equipment under test can be confirmed without the test step or by other means. This decision shall be justified and reported.

Manufacturer's instructions on tests to be performed, shall be considered.

The values in this document shall be used unless the product standard specifically provides in-service limits in which case the product standard limits shall be used or justified values from the manufacturer.

External equipment that could influence the tests should be disconnected, if possible.

Measurement of leakage currents using the direct or residual method shall be performed using a TN supply system or a TT supply system with an earth resistance below 1000 Ω.

NOTE 1 It is preferable to use a TN supply for the measurement of leakage currents using the direct or residual method.

Accessible conductive parts not relevant for touch current measurement can be identified by risk analysis. Risk assessment and risk analysis should be carried out by skilled persons and should be based on knowledge of the electrical circuitry and construction of the Equipment Under Test (EUT).

NOTE 2 In general this document does not address the measurement of DC leakage currents.

5.1.2 Visual inspection

Visual inspection shall be performed according to 5.2.

5.1.3 Test of the effectiveness of protective measures against electric hazards

Test of the protective measures against electric hazards shall be performed according to 5.3 to 5.8.

— Confirmation of the effectiveness of the protective bonding to all accessible conductive parts connected for safety reasons to protective earth according to 5.3.

— Confirmation of the effectiveness of the insulation by measuring the insulation resistance between live parts and accessible conductive parts:

  — connected to protective earth (primarily on class I equipment) according to 5.4;

  — protected by double or reinforced Insulation and not connected to protective earth (primarily on class II equipment but also on class I equipment) according to 5.4;

  — protected by SELV/PELV according to 5.4.

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