BRITISH STANDARD

BS EN
61557-2:2007

# 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

The European Standard EN 61557-2:2007 has the status of a British Standard

ICS 17.220.20; 29.080.01; 29.240.01



British Standards

# National foreword

This British Standard was published by BSI. It is the UK implementation of EN 61557-2:2007. It is identical with IEC 61557-2:2007. It supersedes BS EN 61557-2:1997, which will be withdrawn on 1 March 2010.

The UK participation in its preparation was entrusted to Technical Committee PEL/85, Measuring equipment for electrical and electromagnetic quantities.

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.

**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 29 June 2007



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EUROPEAN STANDARD

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# EN 61557-2

March 2007

ICS 17.220.20; 29.080.01; 29.240.01

Supersedes EN 61557-2:1997

English version

# 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

(IEC 61557-2:2007)

Sécurité électrique dans les réseaux de distribution basse tension de 1 000 V c.a. et 1 500 V. c.c. - Dispositifs de contrôle, de mesure ou de surveillance de mesures de protection - Partie 2: Résistance d'isolement (CEI 61557-2:2007)

Elektrische Sicherheit in Niederspannungsnetzen bis AC 1 000 V und DC 1 500 V - Geräte zum Prüfen, Messen oder Überwachen von Schutzmaßnahmen - Teil 2: Isolationswiderstand (IEC 61557-2:2007)

This European Standard was approved by CENELEC on 2007-03-01. 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, 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: rue de Stassart 35, B - 1050 Brussels**



Ref. No. EN 61557-2:2007 E

## Foreword

The text of document 85/291/FDIS, future edition 2 of IEC 61557-2, prepared by IEC TC 85, Measuring equipment for electrical and electromagnetic quantities, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61557-2 on 2007-03-01.

This European Standard supersedes EN 61557-2:1997.

The following changes were made with respect to EN 61557-2:1997:

– definitions complemented;

– revision of some requirements;

– addition of a warning pictogram;

– complete revision of the subclause on overload tests.

This standard is to be used in conjunction with EN 61557-1.

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) | 2007-12-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2010-03-01 |

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 61557-2:2007 was approved by CENELEC as a European Standard without any modification.

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CONTENTS

# 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



## 1 Scope

This part of IEC 61557 specifies the requirements applicable to equipment for measuring the insulation resistance of equipment and installations in the de-energized state.

## 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.

IEC 61010-1:2001, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 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*

## 3 Terms and definitions

For the purposes of this document, the definitions given in IEC 61557-1 and the following definitions apply.

**3.1**
**rated output voltage**
**$U_N$**
voltage output across the measuring equipment terminals when this equipment is loaded with the rated current

## 4 Requirements

The following requirements as well as those given in IEC 61557-1 shall apply.

**4.1** The output voltage shall be a d.c. voltage; the indication at the rated output voltage across a resistor of a value of $U_N \times (1\ 000\ \Omega/V)$ shall not differ by more than 10 % relative to the indicated value, as a result of possibly present a.c. voltage components in the output voltage, when a capacitor of 2 μF is connected in parallel with the insulation resistance to be measured.

**4.2** The open-circuit voltage shall not exceed 1,25 times the rated output voltage.

**4.3** The rated current shall be at least 1 mA.

**4.4** The measuring current shall not exceed 15 mA peak. Any a.c. component present shall not exceed 1,5 mA peak.

**4.5** The maximum percentage operating uncertainty within the measurement range to be marked or stated shall not exceed ±30 % with the measured value as fiducial value, as determined in accordance with Table 1.

The operating uncertainty shall apply under the rated operating conditions in accordance with IEC 61557-1.

**Table 1 – Calculation of operating uncertainty**

| Intrinsic uncertainty or influence quantity | Reference conditions or specified operating range | Designation code | Requirements or tests in accordance with relevant parts of IEC 61557 | Type of test |
|---|---|---|---|---|
| Intrinsic uncertainty | Reference conditions | $A$ | Part 2, subclause 6.1 | R |
| Position | Reference position ± 90° | $E_1$ | Part 1, subclause 4.2 | R |
| Supply voltage | At the limits stated by the manufacturer | $E_2$ | Part 1, subclauses 4.2, 4.3 | R |
| Temperature | 0 °C and 35 °C | $E_3$ | Part 1, subclause 4.2 | T |
| Operating uncertainty | $B = \pm (\lvert A \rvert + 1{,}15 \sqrt{E_1^2 + E_2^2 + E_3^2})$ | | Part 2, subclause 4.5 | R |

$A$ = intrinsic uncertainty

$E_n$ = variations

R = routine test

T = type test

$$B\,[\%] = \pm \frac{B}{\text{fiducial value}} \times 100\ \%$$

**4.6** The user shall not be subjected to danger, when extraneous d.c. or a.c. voltages up to 120 % of the highest rated ouput voltage are accidentally applied for a duration of 10 s to the measurement terminals of the measuring equipment.

**4.6.1** When the measuring equipment bears one of the following markings, the applied extraneous a.c. overvoltage can be reduced to a voltage of 1,1 times the phase to phase voltage:

a) DO NOT USE IN DISTRIBUTION SYSTEMS WITH VOLTAGES HIGHER THAN ... V.

The marking shall be written in the corresponding country language.

The value of the voltage shown on the marking shall be 1,1 times the maximum phase to phase voltage.

or

b) Example of pictogram for a 500 V a.c. system


The pictogram and outline shall contrast with the background.
The value of the voltage shown on the marking shall be 1,1 times the maximum phase to phase voltage.

After applying this reduced a.c. overvoltage, the equipment shall stay within the specification.

## 5 Marking and operating instructions

### 5.1 Marking

In addition to the marking in accordance with IEC 61557-1, the following information shall be provided on the measuring equipment.

**5.1.1** Rated output voltage.

**5.1.2** Rated current.

**5.1.3** Measurement range in accordance with 4.5.

### 5.2 Operating instructions

The operating instructions shall state the following information in addition to the statements specified in IEC 61557-1.

**5.2.1** A warning stating that measurements shall be carried out only on parts of an installation or equipment that are de-energized.

**5.2.2** A statement on the correct operation when power is supplied by a hand-driven generator.

**5.2.3** In accordance with 6.7, the possible number of measurements shall be stated for measuring equipment with power supplied by batteries/accumulators.

## 6 Tests

In addition to IEC 61557-1 the following tests shall be executed.

**6.1** The operating uncertainty shall be determined in accordance with Table 1. In this process, the intrinsic uncertainties shall be determined under the following reference conditions:

– nominal value of the supply voltage;
– nominal r.p.m. when power is supplied by a hand-driven generator;
– reference temperature 23 °C ± 2 °C;
– reference position in accordance with the manufacturer's statement.

The operating uncertainty thus evaluated shall not exceed the limits specified in 4.5.

**6.2** The open-circuit voltage shall be checked for compliance with the specification in 4.2 *(routine test)*.

**6.3** The rated current shall be tested through a test resistor of a value of $U_N \times (1\ 000\ \Omega/V)$. Compliance with the requirements in 4.3 shall be checked *(routine test).*

**6.4** The measuring current shall be tested and compliance with the requirements in 4.4 shall be checked *(routine test).*

NOTE When an a.c. voltage is superimposed on the d.c., then measuring equipment for measuring the peak value of the current must be used.

**6.5** Tests shall establish that the indication is stable and does not change by more than 10 % when a capacitor of 2 μF ± 10% is connected in parallel. In this condition, the measuring equipment is loaded by a resistor free from capacitance and inductance in such a manner that the rated output voltage and rated current will occur *(type test).*

### 6.6 Overload tests

#### 6.6.1 Overload test with a.c. voltage

The permissible overload in accordance with 4.6 or 4.6.1 shall be tested. For this purpose an a.c. voltage according to 4.6. or 4.6.1 shall be applied for a duration of 10 s whilst the equipment is switched on and off.

The a.c. test source shall have the capability to activate protective devices and to indicate weak points of circuitry. If protective devices are activated or parts are damaged, the test shall be repeated with a test source having a capability according to 16.2 of IEC 61010-1:2001.

After test with a.c. overvoltage according to 4.6, defects, if any, shall be clearly indicated, indications and displayed values shall not lead to unsafe interpretations.

After tests with a.c. overvoltages according to 4.6.1. the equipment shall stay within the specification.

This includes reactivation of protective devices by the user without any repair.

NOTE The replacement of fuses accessible to the user should be considered as reactivation of a protective device.

#### 6.6.2 Overload tests with d.c. voltage

In addition a .d.c. voltage of 1.2 times the magnitude of the highest rated output voltage stored on a capacitor of 2 μF shall be applied in both polarities whilst the equipment is switched on and off. After this the measuring equipment shall stay within the specification, without activation of protective devices.

**6.7** The number of measurements that it is possible to make, until the limit of the voltage range determined by the battery check facility is reached, shall be determined.

In this process, the measuring equipment shall be loaded with a test resistance of $U_N \times (1\ 000\ \Omega/V)$ alternating between 5 s loading and intervals of about 25 s prior to each new loading *(type test)*.

**6.8** Compliance with the tests in this clause shall be recorded.

## Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 61010-1 | 2001 | Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements | EN 61010-1 + corr. June | 2001 2002 |
| IEC 61557-1 | -[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 61557-1 | 2007[2)] |

[1)] Undated reference.

[2)] Valid edition at date of issue.

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