
**Visokonapetostne preskusne tehnike – 3. del: Definicije in zahteve za
preskušanje na kraju samem (IEC 60060-3:2006)**

High voltage test techniques – Part 3: Definitions and requirements for on-site tests
(IEC 60060-3:2006)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60060-3:2006](https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006)

[https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-
a33cea171f4a/sist-en-60060-3-2006](https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60060-3:2006

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

High voltage test techniques
Part 3: Definitions and requirements for on-site tests
(IEC 60060-3:2006)

Techniques des essais à haute tension
Partie 3: Définitions et prescriptions
pour des essais sur site
(CEI 60060-3:2006)

Hochspannungs-Prüftechnik
Teil 3: Begriffe und Anforderungen
für Vor-Ort-Prüfungen
(IEC 60060-3:2006)

This European Standard was approved by CENELEC on 2006-02-01. 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, 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

Foreword

The text of document 42/203/FDIS, future edition 1 of IEC 60060-3, prepared by IEC TC 42, High-voltage testing techniques, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60060-3 on 2006-02-01.

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) 2006-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-02-01

This European Standard makes reference to International Standards. Where the International Standard referred to has been endorsed as a European Standard or a home-grown European Standard exists, this European Standard shall be applied instead. Pertinent information can be found on the CENELEC web site.

Endorsement notice

The text of the International Standard IEC 60060-3:2006 was approved by CENELEC as a European Standard without any modification.

(standards.iteh.ai)

SIST EN 60060-3:2006

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

INTERNATIONAL STANDARD

IEC 60060-3

First edition
2006-02

High-voltage test techniques –

Part 3: Definitions and requirements for on-site testing

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60060-3:2006](https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006)

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

© IEC 2006 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

V

For price, see current catalogue

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions.....	7
4 Common tests and checks on a measuring system.....	12
4.1 Acceptance test.....	12
4.2 Performance test.....	12
4.3 Performance check.....	12
4.4 Record of performance.....	13
5 Tests with direct voltage.....	13
5.1 General.....	13
5.2 Definitions for direct voltage tests.....	13
5.3 Test voltage.....	14
5.4 Measurement of the test voltage.....	14
5.5 Tests and checks on measuring systems.....	15
5.6 Withstand voltage test procedure.....	15
6 Tests with alternating voltage.....	15
6.1 General.....	15
6.2 Definitions for alternating voltage tests.....	15
6.3 Test voltage.....	16
6.4 Measurement of the test voltage.....	17
6.5 Tests and checks on measuring systems.....	18
6.6 Withstand voltage test procedure.....	18
7 Tests with lightning impulse voltage.....	18
7.1 General.....	18
7.2 Definitions for lightning impulse voltage tests.....	18
7.3 Test voltage.....	21
7.4 Measurement of the test voltage and determination of the impulse voltage shape.....	22
7.5 Tests and checks on measuring systems.....	22
7.6 Withstand voltage test procedures.....	23
8 Tests with switching impulse voltage.....	23
8.1 General.....	23
8.2 Definitions for switching impulse voltage tests.....	23
8.3 Test voltage.....	26
8.4 Measurement of the test voltage and determination of the impulse shape.....	26
8.5 Tests and checks on measuring systems.....	27
8.6 Withstand voltage test procedures.....	27
9 Tests with very low frequency voltages.....	28
9.1 General.....	28
9.2 Definitions for very low frequency voltage tests.....	28
9.3 Test voltage.....	29
9.4 Measurement of the test voltage.....	29
9.5 Tests and checks on measuring systems.....	30
9.6 Test procedure.....	30

10 Tests with damped alternating voltages	30
10.1 General	30
10.2 Definitions for damped alternating voltage tests	30
10.3 Test voltage	31
10.4 Measurement of the test voltage.....	32
10.5 Tests and checks on measuring systems.....	32
10.6 Test procedure	33
Figure 1 – Aperiodic lightning impulse	19
Figure 2 – Oscillating lightning impulse.....	20
Figure 3 – Aperiodic switching impulse	24
Figure 4 – Oscillating switching impulse.....	25
Figure 5 – Damped alternating voltage ($f_r = 1$ kHz, $D_f = 0,2$)	31

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60060-3:2006

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

INTERNATIONAL ELECTROECHNICAL COMMISSION

HIGH-VOLTAGE TEST TECHNIQUES –

Part 3: Definitions and requirements for on-site testing

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60060-3 has been prepared by IEC technical committee 42: High-voltage testing techniques.

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

FDIS	Report on voting
42/203/FDIS	42/204/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.

Terms used throughout this standard which have been defined in Clause 3 are written in **bold type**.

IEC 60060 consists of the following parts, under the general title *High-voltage test techniques*:

Part 1: General definitions and test requirements

Part 2: Measuring systems

Part 3: Definitions and requirements for on-site testing

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
- amended.

A bilingual version of this publication may be issued at a later date.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 60060-3:2006

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

INTRODUCTION

The requirements specified in IEC 60060-1 and IEC 60060-2 cannot always be achieved during on-site tests, due to a variety of external factors not present in factory and laboratory tests such as external electric and magnetic fields, weather conditions, etc.

On-site high-voltage tests are required:

- as withstand tests as part of a commissioning procedure on equipment to demonstrate that transport from manufacturer to site, and the erection on-site complies with manufacturer's specification;
- as withstand tests after on-site repair, to demonstrate that the equipment has been successfully repaired, and is in a suitable condition to return to service;
- for diagnostic purposes, e.g. PD measurement, to demonstrate if the insulation is still free from dangerous defects, and as an indication of life expectation.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 60060-3:2006

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

HIGH-VOLTAGE TEST TECHNIQUES –

Part 3: Definitions and requirements for on-site testing

1 Scope

This part of IEC 60060 is applicable to the following on-site test voltages and in service stresses, which are in relation to IEC 60060-1:

- direct voltage;
- alternating voltage;
- lightning impulse voltage of aperiodic or oscillating shape;
- switching impulse voltage of aperiodic or oscillating shape.

For special tests the following voltages are used:

- very low frequency voltage;
- damped alternating voltage.

This standard is applicable to equipment with a highest voltage U_m greater than 1 kV. The selection of on-site test voltages, test procedures and test voltage levels for apparatus, equipment or installations is under the responsibility of the relevant technical committee. For special applications, on-site test voltages different from those described in this standard may be specified by the relevant technical committee.

NOTE 1 The different voltage waveforms listed above do not necessarily provide equal stress on the test object.

NOTE 2 The selection of the test voltage levels should take the larger tolerances and measuring uncertainties into account.

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

IEC 60060-2:1994, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60071-1:1993, *Insulation co-ordination – Part 1: Definitions, principles and rules*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. For all other definitions relating to testing procedures, see IEC 60060-1, and for those relating to measuring systems, see IEC 60060-2. Definitions of parameters are given in the relevant clauses of this standard.

3.1

on-site test

test at the place of use of the apparatus, equipment or installation that is to be tested, and with the test object as far as possible in its service condition

3.2

impulse voltage

intentionally applied aperiodic or oscillating transient voltage, which usually rises rapidly to a peak value and then its enveloping curve falls more slowly to zero

(IEC 60060-1:1989, Term 3, modified)

3.3

lightning and switching impulse voltages

a distinction is made between **lightning and switching impulse voltages** on the basis of duration of the front. Impulses with front duration up to 20 μs are defined as **lightning impulse voltages** and those with longer fronts are defined as **switching impulse voltages**

Generally, **switching impulse voltages** are also characterized by total durations considerably longer than those of **lightning impulse voltages**.

(IEC 60060-1:1989, Term 3.1)

3.4

characteristics of the test voltage

those characteristics specified in this standard for designating the different types of voltage excursion that define the test voltage

(IEC 60060-1:1989, Term 4.2)

3.5

prospective characteristics of a test voltage

the characteristics which would have been obtained if no disruptive discharge had occurred. When a prospective characteristic is used, this shall always be stated

(IEC 60060-1:1989, Term 4.2.1)

[SIST EN 60060-3:2006](https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006)

<https://standards.iteh.ai/catalog/standards/sist/5d8eb2cf-b66b-4d83-b1a1-a33cea171f4a/sist-en-60060-3-2006>

3.6

actual characteristics of a test voltage

characteristics that occur during the test at the terminals of the test object

(IEC 60060-1:1989, Term 4.2.2)

3.7

value of the test voltage

as defined in the relevant clauses of the present standard

(IEC 60060-1:1989, Term 4.2.3)

3.8

classification of insulation in test objects

insulation systems of apparatus and high-voltage structures must basically be classified into **self-restoring** and **non-self-restoring insulation** and may consist of **external** and/or **internal insulation**

(IEC 60060-1:1989, Term 5)

3.8.1

external insulation

distances in atmospheric air, and the surfaces in contact with atmospheric air of solid insulation of the equipment which are subject to dielectric stresses and to the effects of atmospheric and other external conditions such as pollution, humidity, vermin, etc.

(IEC 60071-1:1993, Term 3.2)