

Guide to

High-voltage test techniques for low-voltage equipment —

**Part 1: Definitions, test and procedure
requirements**

The European Standard EN 61180-1:1994 has the status of a
British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Power Electrical Engineering Standards Policy Committee (PEL/-) to Technical Committee PEL/62, upon which the following bodies were represented:

- ASTA Certification Services
- British Cable Makers' Confederation
- British Industrial Ceramic Manufacturers' Association
- Department of Trade and Industry (Namas Executive)
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
- Electricity Supply Industry in England and Wales
- Institute of Science Technology
- Transmission and Distribution Association (BEAMA Ltd.)
- University of Manchester

This British Standard, having been prepared under the direction of the Power Electrical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 March 1993

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National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee. It is identical with IEC 1180-1:1992 *High-voltage test techniques for low-voltage equipment. Part 1: Definitions, test and procedure requirements*, published by the International Electrotechnical Commission (IEC).

In 1994 the European Committee for Electrotechnical Standardization (CENELEC) accepted IEC 1180-1:1992 as European Standard EN 61180-1:1994. As a consequence of implementing the European Standard this British Standard is numbered as BS EN 61180-1 and any reference to BS 7640-1 should be read as a reference to BS EN 61180-1.

Cross-references

International Standard	Corresponding British Standard
IEC 68-1:1988	BS 2011 <i>Environmental testing</i> Part 1.1:1989 <i>General and guidance</i> (Identical)
IEC 270:1981	BS 4828:1985 <i>Guide for partial discharge measurements</i> (Identical)
IEC 664:1980	PD 6499:1981 <i>Guide to insulation co-ordination within low-voltage systems including clearances and creepage distances for equipment</i> (Identical)

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

UDC 621.313.027.2:62-83:620.1:621.3.027.3

Descriptors: High-voltage tests, low-voltage equipment, dielectric test, tests with impulse current

English version

High-voltage test techniques for low-voltage equipment Part 1: Definitions, test and procedure requirements

(IEC 1180-1:1992)

Techniques des essais à haute tension pour
matériels à basse tension
Partie 1: Définitions, prescriptions et modalités
relatives aux essais
(CEI 1180-1:1992)

Hochspannungs-Prüftechnik für
Niederspannungsgeräte
Teil 1: Begriffe, Prüfung und Prüfbedingungen
(IEC 1180-1:1992)

This European Standard was approved by CENELEC on 1994-03-08. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and 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 CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1180-1:1992 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 61880-1 on 8 March 1994.

The following dates were fixed:

- latest date of publication
of an identical national
standard (dop) 1995-03-15
- latest date of withdrawal
of conflicting national
standards (dow) 1995-03-15

For products which have complied with the relevant national standard before 1995-03-15, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-03-15.

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given only for information. In this standard, Annex A and Annex B are informative and Annex ZA is normative.

Introduction

This International Standard has been prepared in accordance with the decision taken by technical committee 42 to provide a standard covering the high voltage testing of low-voltage equipment. It is based on IEC 60-1:1989. The standard is in two parts. Part 1 covers general definitions and requirements, where sections 1 to 3 may be applicable to all kinds of electrical equipment, sections 4 to 6 apply to electrical equipment without voltage limiting devices, section 7 applies to voltage limiting devices alone, and section 8 applies to equipment incorporating non-linear or voltage limiting devices. Part 2 covers measuring systems and test apparatus (in preparation).

This standard includes high-voltage and impulse current testing as well as a combination of both.

This standard will be of special interest to product committees such as TC 2, SC 12B, SC 17B, SC 17D, TC 22, TC 23, SC 37A, TC 61, TC 64, TC 65, SC 66E and TC 74.

Section 1. General

1.1 Scope

This part of IEC 1180 is applicable to:

- dielectric tests with direct voltage;
- dielectric tests with alternating voltage;
- dielectric tests with impulse voltage;
- tests with impulse current;
- tests with combinations of the above.

This standard is applicable only to tests on equipment having a rated voltage of not more than 1 kV a.c. or 1,5 kV d.c.

This standard is mainly applicable to type testing. It may also be applied or adapted for sample and routine testing as specified by the relevant technical committee.

It is not intended to be used for electromagnetic compatibility tests on electric or electronic equipment.

This standard provides the relevant technical committees as far as possible with:

- defined terms of both general and specific applicability;
- general requirements regarding test objects and test procedures;
- methods for generation and measurement of test voltages and currents;
- test procedures;
- methods for the evaluation of test results and to indicate criteria for acceptance;
- requirements concerning approved measuring devices and checking methods.

Alternative test procedures may be required and these shall be specified by the relevant technical committees.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1180. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1180 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 270:1981, *Partial discharge measurements*.

IEC 664:1980, *Insulation co-ordination within low-voltage systems including clearances and creepage distances for equipment*.

Amendment No. 1, 1989.

Section 2. Definitions

2.1 Impulse techniques and insulation

2.1.1 impulse

an intentionally applied aperiodic transient voltage or current which usually rises rapidly to a peak value and then falls more slowly to zero

NOTE The term “impulse” is distinguished from the term “surge”, which refers to transients occurring in electrical equipment or networks in service.

2.1.2 partial breakdown

this phenomenon may occur when solid insulation is stressed by impulse voltages. It is indicated by a stepwise reduction in impulse voltage waveform which occurs earlier in time in successive impulses, or by other effects specified by the relevant technical committee. This indicates progressive deterioration of the insulation

2.1.3 clearance [IEV 441-17-31]

the shortest distance in air between two conductive parts

2.1.4 creepage distance [IEV 151-03-37]

the shortest distance along the surface of an insulating material between two conductive parts

2.1.5 solid insulation

solid insulating material interposed between two conductive parts

2.2 Characteristics related to disruptive discharge and test voltages

2.2.1 disruptive discharge

the failure of insulation under electrical stress, in which the discharge completely bridges the insulation under test, reducing the voltage between the electrodes practically to zero. It applies to electrical breakdown in solid, liquid and gaseous dielectrics and combinations of these

NOTE 1 Non-sustained disruptive discharges in which the test object is momentarily bridged by a spark or arc may occur. During these events, the voltage across the test object is momentarily reduced to zero or to a very small value. Depending on the characteristics of the test circuit and the test object, a recovery of dielectric strength may occur and may even permit the test voltage to reach a higher value. Such an event should be interpreted as a disruptive discharge unless otherwise specified by the relevant technical committee.

NOTE 2 Some non-disruptive discharges are termed “partial discharges” and are dealt with in IEC 270.

NOTE 3 The term “sparkover” is used when a disruptive discharge occurs in a gaseous or liquid medium.

The term “flashover” is used when a disruptive discharge occurs over the surface of a dielectric in a gaseous or liquid medium.

The term “puncture” is used when a disruptive discharge occurs through a solid dielectric.

2.2.2 Characteristics of the test voltage

Those characteristics specified in this standard in order to define the different types of test voltage.

2.2.2.1 prospective characteristics of a test voltage

the characteristics which would have been obtained if no disruptive discharge or operation of a voltage limiting device had occurred. When a prospective characteristic is referred to, this shall always be stated

2.2.2.2 actual characteristics of a test voltage

those which occur during the test at the terminals of the test object

2.2.2.3 value of the test voltage

the value of the test voltage is defined in 4.1.1, 5.1.1 and 6.1.1.1