

Voltage characteristics of electricity supplied by public distribution systems

The European Standard EN 50160:1999 has the status of a
British Standard

ICS 29.020

National foreword

This British Standard is the official English language version of EN 50160:1999, including Corrigenda January 2004, April 2004 and September 2004. It supersedes BS EN 50160:1995 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC policy, to Subcommittee GEL/210/8, EMC low frequency phenomena, 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 the 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 19 and a back cover.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 February 2000

Amendments issued since publication

Amd. No.	Date	Comments
15022 Corrigendum No. 1	13 March 2004	Correction to Subclause 2.2, Note 1 replaced 2003 by 2008
15181 Corrigendum No. 2	19 May 2004	Correction to Subclause 2.3, Note 1 replaced 2003 by 2008
15390 Corrigendum No. 3	4 October 2004	Deletion of Note 1 in Subclause 2.2

English version

Voltage characteristics of electricity supplied by public distribution systems

Caractéristiques de la tension fournie
par les réseaux publics de distribution

Merkmale der Spannung in öffentlichen
Elektrizitätsversorgungsnetzen

This European Standard was approved by CENELEC on 1999-01-01. 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.

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CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, 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

This European Standard was prepared by the CENELEC BTTF 68-6, Physical characteristics of electrical energy. The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50160 on 1994-07-05.

Three drafts for amendments (prAA, prAB, prAC) were submitted to the CENELEC formal vote and were approved by CENELEC on 1999-01-01 for inclusion into a second edition of EN 50160.

This European Standard replaces EN 50160:1994.

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) 2000-05-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2000-05-01

Annexes designated "informative" are given for information only.
In this standard, annex A is informative.

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1 General

1.1 Scope

This standard gives the main characteristics of the voltage at the customer's supply terminals in public low voltage and medium voltage electricity distribution systems under normal operating conditions. This standard gives the limits or values within which any customer can expect the voltage characteristics to remain, and does not describe the typical situation for a customer connected to a public supply network.

NOTE: For the definitions of low and medium voltage see 1.3.7 and 1.3.8.

The standard does not apply under abnormal operating conditions including the following:

- conditions arising as a result of a fault or a temporary supply arrangement adopted to keep customers supplied during maintenance and construction work or to minimize the extent and duration of a loss of supply,
- in case of non-compliance of a customer's installation or equipment with the relevant standards or with the technical requirements for connection of loads, established either by the public authorities or the electricity supplier including the limits for the emission of conducted disturbances,
- in case of non-compliance of a generation installation with the relevant standards or with the technical requirements for interconnection with an electricity distribution system established either by the public authorities or the electricity supplier (e.g. embedded generation),
- in exceptional situations outside the electricity supplier's control, in particular,
 - exceptional weather conditions and other natural disasters,
 - third party interference,
 - acts by public authorities,
 - industrial actions (subject to legal requirements),
 - *force majeure*,
 - power shortages resulting from external events.

The voltage characteristics given in this standard are not intended to be used as electromagnetic compatibility (EMC) levels or user emission limits for conducted disturbances in public distribution systems.

The voltage characteristics given in this standard are not intended to be used to specify requirements in equipment product standards, but should be considered. It should be especially noted that the performance of equipment might be impaired if it is subjected to supply conditions which are not taken into account in the equipment product standard.

This standard may be superseded in total or in part by the terms of a contract between the individual customer and the electricity supplier.

1.2 Object

The object of this standard is to define and describe the characteristics of the supply voltage concerning:

- frequency;
- magnitude;
- wave form;
- symmetry of the three phase voltages.

These characteristics are subject to variations during the normal operation of a supply system due to changes of load, disturbances generated by certain equipment and the occurrence of faults which are mainly caused by external events.

The characteristics vary in a manner which is random in time, with reference to any specific supply terminal, and random in location, with reference to any given instant of time. Because of these variations, the levels of the characteristics can be expected to be exceeded on a small number of occasions.

Some of the phenomena affecting the voltage are particularly unpredictable, so that it is impossible to give definite values for the corresponding characteristics. The values given in this standard for such phenomena, e.g. voltage dips and voltage interruptions, shall be interpreted accordingly.

1.3 Definitions

For the purposes of this standard, the following definitions apply.

1.3.1 customer

The purchaser of electricity from a supplier.

1.3.2 supplier

The party who provides electricity via a public distribution system.

1.3.3 supply terminals

Point of connection of the customer's installation to the public system.

NOTE: This point can differ from, for example, the electricity metering point or the point of common coupling.

1.3.4 supply voltage

The rms value of the voltage at a given time at the supply terminals, measured over a given interval.

1.3.5 nominal voltage of a system (U_n)

The voltage by which a system is designated or identified and to which certain operating characteristics are referred.

1.3.6 declared supply voltage (U_c)

The declared supply voltage U_c is normally the nominal voltage U_n of the system. If by agreement between the supplier and the customer a voltage different from the nominal voltage is applied to the terminal, then this voltage is the declared supply voltage U_c .