



BSI Standards Publication

## **Voltage characteristics of electricity supplied by public electricity networks**

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This is a preview of BS EN 50160:2022+A1:2025. [Click here to purchase the full version from the ANSI store.](#)

## National foreword

This British Standard is the UK implementation of EN 50160:2022+A1:2025. It supersedes BS EN 50160:2022, which will be withdrawn on 7 November 2025.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CENELEC text carry the number of the CENELEC amendment. For example, text altered by CENELEC amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee GEL/8, Systems Aspects for Electrical Energy Supply.

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

BSI, as a member of CLC, is obliged to publish EN 50160:2022+A1:2024 as a British Standard. However, attention is drawn to the fact that during the development of this amended European Standard, the UK committee identified changes related to Table 8 which could affect user implementation in regard to current UK practices.

The amendments to Subclause 6.2.5 and Subclause 7.2.5 of EN 50160:2022 mean that the recommended values of harmonic emissions in Table 8 would now become mandatory for HV and EHV systems, respectively. This is a technical change from the current version of EN 50160:2022, where the harmonic emissions in Table 8 are stated as being indicative values.

The UK committee do not believe the compatibility limits in Engineering Recommendation (EREC) G5 can be readily amended to comply with the now normative limits stated in Table 8 of the amendment to EN 50160:2022.

Member Companies of the Energy Networks Association (ENA) require connections to their public electricity networks to adhere to planning levels and compatibility levels for harmonic emissions in ENA Engineering Recommendation (EREC) G5. EREC G5 is listed in Annex 1 of The Distribution Code of Licensed Distribution Network Operators of Great Britain, and it implements requirements in the Distribution Code. Compliance with the core industry documents, one of which is the Distribution Code, is a requirement of Condition 20 (Compliance with Core Industry Documents) of the Standard Conditions of the Electricity Distribution Licence. The Electricity Act 1989 places duties and obligations on Distribution Network Operators through these Standard Licence Conditions (SLCs) and general provisions in the Act. In summary, compliance with EREC G5 is indirectly enabled through the Electricity Act 1989.

The scope of EREC G5 applies to HV systems up to 230 kV and EHV systems above 230 kV. Section 5 of EREC G5 stipulates planning and compatibility levels for harmonic emissions. In particular, Table 10 of EREC G5 stipulates compatibility levels for harmonic voltages above 25 kV and less than or equal to 66 kV. The values in Table 10 for the 3rd, 5th and 7th orders are greater than those for the equivalent harmonic orders in Table 8 of BS EN 50160. This means that harmonic emission values that meet compatibility levels in EREC G5 might not comply with those values that are now required rather than indicative in the proposed amendment to EN 50160.

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Although EN 50160 relates to voltage characteristics of electricity and does not specify compatibility levels, there are obvious comparisons that can be drawn between the levels in Table 8 of EN 50160 and the compatibility levels in Table 10 of EREC G5. The proposed amendment in EN 50160 to mandate compliance with the levels in Table 8 for HV and EHV systems may affect the discretion that the Licensed Distribution Network Operators of Great Britain might have to exceed planning levels or compatibility levels in EREC G5 for new connections at HV and EHV, where they might result in the values in Table 8 of EN 50160 being exceeded. This might hinder the acceptance of new connections, where existing emissions are close to the compatibility levels stated in EREC G5.

The UK committee would therefore like to draw users' attention to this matter.

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### **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 31 January 2023.

### **Amendments/corrigenda issued since publication**

Date	Text affected
31 January 2025	Implementation of CENELEC amendment A1:2025

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## EUROPÄISCHE NORM

January 2025

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Supersedes EN 50160:2010;  
EN 50160:2010/corrigendum Dec. 2010;  
EN 50160:2010/AC:2012; EN 50160:2010/A1:2015;  
EN 50160:2010/A2:2019; EN 50160:2010/A3:2019

English Version

## Voltage characteristics of electricity supplied by public electricity networks

Caractéristiques de la tension fournie par les réseaux  
publics d'électricité

Merkmale der Spannung in öffentlichen  
Energieversorgungsnetzen

This European Standard was approved by CENELEC on 2022-11-07. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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This document (EN 50160:2022) has been prepared by CLC TC8X “System aspects of electrical energy supply”.

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) 2023-11-07
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-11-07

This document supersedes EN 50160:2010 and all of its amendments and corrigenda (if any).

EN 50160:2022 includes the following significant technical changes with respect to EN 50160:2010:

- implementation of amendments A2 (new frequency range 2-150 kHz, amendment on power frequency) and A3 (changed value on 15th and 21st harmonic in LV);
- The Norway A-deviation (amendment A1) was slightly modified;
- slight clarifications in the scope;
- integration of a new clause “extra high voltage”;
- clarification to dips and swells;
- new Annex D: PQ versus EMC.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national committee. A complete listing of these bodies can be found on the CENELEC website.

## European foreword

This document EN 50160:2022/A1:2025 has been prepared by TC 8X “System aspects of electrical energy supply”.

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) 2026-01-31
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2025-11-07

This document amends EN 50160:2022.

This Amendment does not include significant technical changes, but it is needed to better clarify some standard contents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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## 1 Scope

### 1.1 Application

This document specifies the main characteristics of the voltage at a network user's supply terminals in public low voltage, medium, high, and extra-high voltage AC electricity networks under normal operating conditions. This document specifies the limits or values within which the voltage characteristics can be expected to remain at any supply terminal in public European electricity networks, only. Industrial networks are excluded from the scope of EN 50160.

NOTE 1 If non-public networks (e.g. residential quarters, energy communities, office centres, shopping centres) have similar end-users as public networks, it is strongly advised to apply the same requirements as for public networks.

This document does not apply under abnormal operating conditions, including the following:

- a) a temporary supply arrangement to keep network users supplied during conditions arising as a result of a fault, maintenance and construction work, or to minimize the extent and duration of a loss of supply;
- b) in the case of non-compliance of a network user's installation or equipment with the relevant standards or with the technical requirements for connection, established either by the public authorities or the network operator, including the limits for the emission of conducted disturbances;

NOTE 2 A network user's installation can include load and generation.

- c) in exceptional situations, in particular:

- 1) exceptional weather conditions and other natural disasters;
- 2) third party interference;
- 3) acts by public authorities,
- 4) industrial actions (subject to legal requirements);
- 5) force majeure;
- 6) power shortages resulting from external events.

The voltage characteristics given in this document refer to conducted disturbances in public electric power networks. They are not intended to be used as electromagnetic compatibility (EMC) levels or product emission limits.

Power quality is related to EMC in several ways – especially because compliance with power quality requirements depends on the control of cumulative effect of electromagnetic emissions from all/multiple equipment and/or installations. Therefore, the voltage characteristics given in this document gives guidance for specifying requirements in equipment product standards and in installation standards.

NOTE 3 The performance of equipment might be impaired if it is subjected to supply conditions which are not specified in the equipment product standard.

NOTE 4 This document can be superseded in total or in part by the terms of a contract between the individual network user and the network operator.

The sharing of complaint management and problem mitigation costs between the involved parties is outside the scope of EN 50160.

Measurement methods to be applied in this document are described in EN 61000-4-30.