

*Incorporating
Amendment Nos. 1 and
2 and implementing
Amendment No. 3, not
published separately*

Specification for

**Signalling on low-voltage
electrical installations in the
frequency range 3 kHz
to 148.5 kHz**

**Part 1. General requirements, frequency
bands and electromagnetic disturbances**

The European Standard EN 50065-1 : 1991, together with its amendments
A1 : 1993, A2 : 1995 and A3 : 1996, has the status of a British Standard

ICS 33.040.30

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National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee and is the English language version of EN 50065-1 *Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz Part 1 General requirements, frequency bands and electromagnetic disturbances*, including amendments A1 : 1993, A2 : 1995 and A3 : 1996, published by the European Committee for Electrotechnical Standardization (CENELEC).

It supersedes BS 6839 : Part 1 : 1987, which is withdrawn.

The foreword of EN 50065-1 states this is the first of a series. The following standards are in development:

- Methods of measurement of transmitter output in the range 3 kHz to 9 kHz;
- Test methods for immunity against disturbed signals;
- Limits of immunity against disturbed signals;
- Protocol definition for data integrity and interface;
- Standards for filters and associated components;
- Output voltage for frequency band 9 kHz to 95 kHz.

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given for information only. National appendices are designated 'informative'.

Amendment A1 to EN 50065-1 introduced figures 4 to 8, together with changes to subclauses 4.1.1, 6.1, 6.3.1 and 6.3.2.

Amendment A2 introduced a new annex E, together with changes to clause 7.

Amendment A3 introduced a new annex F together with changes to clauses 6, 8.1 and 9.

Cross-references. Details of international standards quoted in this British Standard for which there is an identical or technically equivalent British Standard are given in national appendix NB.

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, and inside back cover and a back cover.

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Descriptors: Supply mains, low voltage, transmission, frequency, signal, quality

English version

Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz

Part 1 : General requirements, frequency bands and electromagnetic disturbances

(includes amendments A1 : 1993, A2 : 1995 and A3 : 1996)

Transmission de signaux sur les réseaux électriques basse-tension dans la bande de fréquences de 3 kHz à 148,5 kHz

Première partie: Règles générales, bandes de fréquences et perturbations électromagnétiques (inclut les amendements A1 : 1993, A2 : 1995 et A3 : 1996)

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz

Teil 1: Allgemeine Anforderungen, Frequenzbänder und elektromagnetische Verträglichkeit (enthält Änderungen A1 : 1993, A2 : 1995 und A3 : 1996)

This European Standard was approved by CENELEC on 1990-09-11. 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

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Foreword

This standard has been prepared by the CENELEC technical subcommittee SC 105A on the basis of contributions by several CENELEC countries. It is the first part of a series of standards on mains communication systems.

The text of this standard was approved by CENELEC as EN 50065-1 on 11 September 1990.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1991-09-15
- latest date of withdrawal of conflicting national standards (dow) 1991-09-15

Annexes designated 'normative' are part of the body of the standard.

Other international publications quoted in this standard

CISPR 16 : Specification for radio interference
1987 measuring apparatus and measurement
method

Foreword to amendment A1

As signalling in the band 3 kHz up to 9 kHz was left under consideration in EN 50065-1, CENELEC Subcommittee SC 105A decided to set up a working group WG 1 to prepare an amendment to EN 50065-1 to deal with this matter.

As maximum output levels in the band 9 kHz up to 95 kHz were left under consideration in EN 50065-1, CENELEC Subcommittee SC 105A decided to set up a working group WG 5 to prepare an amendment to EN 50065-1 to deal with this matter.

The work results of CLC/SC 105A/WG1, document CLC/SC 105A (Secretary) 48, and CLC/SC 105A/WG 5, document CLC/SC 105A (Secretary) 46A, were discussed by SC 105A during their meeting on 8 and 9 October 1991 in Brussels, when it was decided to submit these documents to the CENELEC Unique Acceptance Procedure (UAP).

The documents were circulated as prAA and prAB in December 1991 and were approved by CENELEC as amendment A1 to EN 50065 on 15 September 1992.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1993-06-01
- latest date of withdrawal of conflicting national standards (dow) 1994-12-01

Foreword to amendment A2

The difficulties caused by the bandwidth of the measuring instrument for the measurement of signals above 150 kHz are mentioned in CLC/SC 105A (Secretariat) 47. The basic difficulty, as discussed at the eleventh and twelfth meeting of SC 105A, is that the measuring instrument defined by the minimum requirements of CISPR 16 is unsuitable for the measurement of mains signalling equipment that uses a signalling frequency not far below 150 kHz, due to the wide variation in attenuation allowed and also that the attenuation is not specified beyond 20dB. At its thirteenth meeting SC 105A agreed that the proper solution would be to specify the attenuation characteristic of the measuring receiver more closely, receivers of this specification being known to be available on the market. The attached amendment gives the attenuation characteristics of a suitable receiver.

This amendment was prepared by SC 105A, Mains communicating systems, of Technical Committee CENELEC TC 105, Home and Building Electronic Systems (HBES).

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A2 to EN 50065-1 : 1991 on 1994-12-06.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1995-10-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1995-10-01

Foreword to amendment A3

The text of draft amendment prAD was prepared by SC 205A, Mains communicating systems, of Technical Committee CENELEC TC 205, Home and Building Electronic Systems (HBES). It was submitted to the Unique Acceptance Procedure in March 1995 and was approved by CENELEC as amendment A3 to EN 50065-1 : 1995 on 1995-11-28.

The text of draft amendment prAE, prepared by the same CENELEC Subcommittee, was submitted to the Unique Acceptance Procedure in June 1995 and was approved by CENELEC on 1996-03-05.

The 87th Technical Board of CENELEC has decided to combine both texts and approved them as amendment A3 to EN 50065-1 : 1991.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-03-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1997-03-01

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1 Scope

This standard applies to electrical equipment using signals in the frequency range 3 kHz to 148,5 kHz to transmit information on low voltage electrical systems, either on the public supply system or within installations in consumers' premises.

It specifies the frequency bands allocated to the different applications, limits for the terminal output voltage in the operating band and limits for conducted and radiated disturbance. It also gives the methods of measurement.

It does not specify the signal modulation methods nor the coding methods nor functional features (except those for the prevention of mutual interference).

Environmental requirements and tests are not included.

NOTE. In most countries the transmission of information is subject to regulation. Compliance with this standard does not imply permission to establish communication with locations outside the consumer's installation or with other consumers through the public supply system where this would not otherwise be allowed.

2 Object

The object of the standard is to limit mutual influence between signal transmission equipment in electrical installations and between such equipment and other equipment. In addition this standard is intended to limit interference caused by signal transmission equipment to sensitive electronic equipment. However, complete freedom from such interference cannot be assured.

3 Definitions

The definitions in Chapter 161 of the International Electrotechnical Vocabulary, IEC Publication 50(161), apply.

4 Frequency bands

NOTE. Additional provisions may apply in the event of interference to radio communication service.

4.1 Band 3 kHz up to 95 kHz

4.1.1 Band 3 kHz up to 9 kHz

The use of frequencies in this band shall be restricted to electricity suppliers.

Frequencies in this band may, however, be used for common mode signalling within consumers' premises in cases and under conditions authorized by the electricity supplier provided the requirements of 6.3.1 are met

4.1.2 Band above 9 kHz up to 95 kHz

The use of frequencies in this band shall be restricted to electricity suppliers and their licensees.

4.2 Band above 95 kHz up to 148,5 kHz

The use of frequencies in this band shall be restricted to consumer use.

4.2.1 Band above 95 kHz up to 125 kHz

The use of this band does not require an access protocol.

4.2.2 Band above 125 kHz up to 140 kHz

Signalling in this band requires the use of the access protocol described in clause 5.

4.2.3 Band above 140 kHz up to 148,5 kHz

The use of this band does not require an access protocol.

5 Access protocol

5.1 In order to allow several systems to operate on the same mains installation the following requirements apply for the band 125-140 kHz. All systems shall use the frequency 132,5 kHz to indicate that a transmission is in progress.

5.2 No transmitter or group of transmitters shall transmit continuously for a period exceeding 1 s and after each transmission shall not transmit again for at least 125 ms; a transmission is considered as a series of signals in which there is no gap greater than 80 ms without signal transmission.

NOTE. This allows a sequence of transmission, repetition and answer-back signals to occupy up to 1 s.

5.3 Every device capable of transmitting shall be equipped with a signal detector which shall indicate when the band is in use; band in use is the condition when any signal of at least 80 dB (μ V) rms anywhere in the frequency range 131,5 kHz to 133,5 kHz and having lasted for at least 4 ms is present at the device's main input terminations and across the conductors used by the device's own transmitter. The frequency range of detection of a signal shall be tested as described in annex A.

5.4 Every device capable of transmitting shall only transmit if its band-in-use detector has shown that the band has not been in use (as defined in subclause 5.3) for a period, randomly chosen on each occasion and uniformly distributed between 85 ms and 115 ms with at least seven possible values in that range.

5.5 To enable band in use to be detected a device shall transmit its signal with a spectral distribution in accordance with annex B.

6 Transmitter output voltage

Common-mode injection shall not be used unless otherwise explicitly allowed in local regulations (see also clause 9).

6.1 Measuring circuit

6.1.1 Differential mode transmitters

For any measuring method the output voltage in the frequency range 9 kHz up to 150 kHz shall be measured using an artificial network of $(50 \Omega/50 \mu\text{H} + 5 \Omega)$ conforming to subclause 8.2.1 of CISPR Publication 16, second edition. For the band 3 kHz up to 9 kHz an amendment of the above network to $(50 \Omega/50 \mu\text{H} + 1,6 \Omega)$ shall be used. The idealized impedance curve is shown in figure 7 and a practical realization of the curve including isolation from the supply is shown in figure 4.

In the case of differential mode transmitters the measurement output is 6 dB below the true differential output.