SLOVENSKI STANDARD
SIST EN 50065-1:2003

01-februar-2003

Nadomešča:
SIST EN 50065-1:1997
SIST EN 50065-1:1997/A1:1997
SIST EN 50065-1:1997/A2:1998
SIST EN 50065-1:1997/A3:1998

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

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

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz -- Teil 1: Allgemeine Anforderungen, Frequenzbänder und elektromagnetische Störungen

Transmission de signaux sur les réseaux électriques basse tension dans la bande de fréquences de 3 kHz à 148,5 kHz -- Partie 1: Règles générales, bandes de fréquences et perturbations électromagnétiques

Ta slovenski standard je istoveten z: **EN 50065-1:2001**

ICS:

33.040.30	Komutacijski in signalizacijski sistem	Switching and signalling systems
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

SIST EN 50065-1:2003 **en**

EUROPEAN STANDARD **EN 50065-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM July 2001

ICS 33.040.30 Supersedes EN 50065-1:1991 + A1:1992 + A2:1995 + A3:1996

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

Transmission de signaux sur les réseaux électriques basse-tension dans la bande de fréquences de 3 kHz à 148,5 kHz Partie 1: Règles générales, bandes de fréquences et perturbations électromagnétiques

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz Teil 1: Allgemeine Anforderungen, Frequenzbänder und elektromagnetische Störungen

This European Standard was approved by CENELEC on 2000-08-01. 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, 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

Ref. No. EN 50065-1:2001 E

Foreword

This standard has been prepared by the CENELEC technical subcommittee SC 205A, Mains communication systems, of Technical Committee CENELEC TC 205, Home and Building Electronic Systems (HBES) following the quinquennial review of EN 50065-1:1991 with the incorporation of amendments A1:1992, A2:1995 and A3:1996.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50065-1 on 2000-08-01.

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) 2002-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-04-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A, B, C, D and E are normative and annex F is informative.

Modifications have been made to clause 5 to take account of false band-in-use detection. Common-mode signalling in the 3 – 9 kHz sub-band has been deleted. Additions have also been made to clause 6 in order to take account of three-phase signalling and an extra test for two transmitters operating simultaneously has been added in subclause 8.5. Sub-divisions of the utility and consumer bands are now referred to as sub-bands.
SC 205A has taken the advice of CENELEC BT regarding the conflict arising from the publication of EN 55015:1996 and has therefore increased the threshold and lower transmit level for the consumer band by +6 dB(μV).
References have been updated to include CISPR 16-1 and CISPR 16-2. Other changes have been made to add clarity and bring the figures up to date.

EN 50065 consists of the following parts, under the general title: 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
Part 2-1	Immunity requirements for mains communications equipment and systems operating in the range of frequencies 95 kHz to 148,5 kHz and intended for use in residential, commercial and light industrial environments
Part 2-2	Immunity requirements for mains communications equipment and systems operating in the range of frequencies 95 kHz to 148,5 kHz and intended for use in industrial environments
Part 2-3	Immunity requirements for mains communications equipment and systems operating in the range of frequencies 3 kHz to 95 kHz and intended for use by electricity suppliers and distributors
Part 4-1	Low voltage decoupling filters – Generic specification
Part 4-2	Low voltage decoupling filters – Safety requirements
Part 4-3	Low voltage decoupling filters – Incoming filter
Part 4-4	Low voltage decoupling filters – Impedance filter
Part 4-5	Low voltage decoupling filters – Segmentation filter
Part 4-6	Low voltage decoupling filters – Phase coupler
Part 7	Equipment impedance

Contents

Annexes

Figures Page

Tables

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.

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.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

IEC 60050-161		International electrotechnical vocabulary – Chapter 161:Electromagnetic compatibility
CISPR 16-1	1993	Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus
CISPR 16-2	1996	Specification for radio disturbance and immunity measuring apparatus and methods – Part 2: Methods of measurement of disturbances and immunity

3 Definitions

The definitions in Chapter 161 of the International Electrotechnical Vocabulary apply.

4 Frequency bands and classifications

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

4.1 Band 3 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.

Equipment for use in this frequency band is designated as either Class 122 or as Class 134 equipment. Class 122 equipment is suitable for general use, but the use of Class 134 equipment may require prior notification, or consent of, appropriate authorities.

Equipment manufactured to Class 116 of the previous edition of this standard will now meet the requirements of Class 122 and may be marked Class 116 provided that its output complies with the previous standard.

4.2.1 *Sub-band above 95 kHz up to 125 kHz*

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

4.2.2 *Sub-band above 125 kHz up to 140 kHz*

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

4.2.3 *Sub-band above 140 kHz up to 148,5 kHz*

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

5 Access protocol

5.1 Access Protocol Overview

A carrier-sense multiple-access (CSMA) protocol is used in the frequency sub-band 125 kHz to 140 kHz to allow several systems to operate on the same, or electrically connected, mains networks. These systems may use the same or different communication protocols but shall use the access protocol given in this clause.

Signals transmitted by systems operating in this sub-band are required to have a defined spectral distribution and maximum duration such that their carrier may be detected by other devices on that network. The presence of this characteristic signal on the network above a minimum level indicates that the frequency sub-band is being used. This state is termed “band-in-use”. Devices with pending transmissions may not transmit whilst the band is in use and until the band has been free for a minimum period.

To provide multiple access, devices with pending transmissions are required to randomise their transmission attempts over a time interval to reduce the possibility of collisions between two or more transmissions. The most recent device to transmit is required to wait until the end of that time interval before attempting a further transmission to prevent it taking too great a share of the available transmission capacity. The maximum length of any transmission is limited for the same reason.

5.2 Band in use signalling

All devices shall use the frequency 132,5 kHz to indicate that a transmission is in progress.

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

5.3 Band in use condition

Every device capable of transmitting shall be equipped with a signal detector which shall indicate when the sub-band is in use. Band-in-use is the condition when any signal of at least 86 dB(μV) rms is present anywhere in the frequency range 131,5 kHz to 133,5 kHz for at least 4 ms. This shall be measured 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.

The band-in-use indication may be considered false if the output from the signal detector is present without any interruption greater than 80 ms for a continuous period of at least 1.1 s immediately prior to each transmission. For a transmitter or a group of transmitters the measurement of this 1.1 s interval shall recommence after the end of transmission by that transmitter or group of transmitter. Any gap in the band-in-use indication greater than 80 ms shall reset the false band-in-use condition.

NOTE The measurement point referred to in the above subclause differs from that described in CISPR 16-1:1993.

5.4 Allowed use of the sub-band

A transmission is considered as a series of signals in which there is no gap greater than 80 ms without signal transmission. A group of transmitters is a number of devices, using the same protocol and co-ordinating their actions so as to meet these requirements e.g. a demand-acknowledge-answer sequence.

No transmitter or group of transmitters shall transmit continuously for a period exceeding 1 s. After each transmission a transmitter or a group of transmitters shall not transmit again for at least 125 ms.

The requirements of subclauses 5.4 and 5.5 shall be met either by each transmitter individually or, at the suppliers option, by a group of transmitters. In the second case, the access protocol allows a sequence of transmission, repetition and answer-back signals to occupy the sub-band for the maximum time otherwise permitted for a single message.

5.5 Access rule

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

6 Transmitter output voltage

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

6.1.1 Measuring circuit for single-phase devices

For any measuring method the output voltage in the frequency range 9 kHz up to 150 kHz shall be measured using a single phase artificial mains network conforming to subclause 11.2 of CISPR 16-1:1993.

For the sub-band 3 - 9 kHz an artificial network conforming to the impedance characteristic of Figure 2 of this standard shall be used.

6.1.2 Measuring circuit for three-phase devices

For any measuring method the output voltage in the frequency range 9 kHz up to 150 kHz shall be measured using a three-phase artificial mains network conforming to subclause 11.2 of CISPR 16-1:1993.

For the sub-band 3 - 9 kHz an artificial network conforming to the impedance characteristic of Figure 2 of this standard shall be used.

Where the supplier's instructions indicate that the three-phase device can also be used as a single-phase device by connecting all phase terminals to the same phase, the device shall also be tested as a single-phase device. This is because the device performance may change as the loading conditions vary between three-phase and single-phase use.

NOTE 1 Measurements are prescribed in differing manners for three-phase devices which transmit on three phases simultaneously and for three-phase devices which transmit on only a single phase at any one time, even if they may transmit on two or more phases in sequence.

NOTE 2 The use of the three-phase network for testing three-phase devices that transmit on three phases simultaneously changes the relationship between measurements made on the phases and measurements made on the neutral when compared with practical applications. When using the three-phase network, the value measured on the neutral is increased by approximately 3.5 dB (µV) and those measured on the phase are decreased by 6 dB (µV) amount. The limit values given in subclause 6.3.2, and which apply to the measured values, include corrections for these changes.

6.2 Output signal measurement

6.2.1 *Determination of bandwidth*

The output signal spectrum is determined by the use of a spectrum analyser having a peak detector and a 100 Hz bandwidth.

The transmitter shall operate in such a way that the bandwidth and output signal magnitude have the greatest values permitted by the manufacturer's specification.

The spectral width (B in Hz) is defined by the length of the interval where all the frequency lines are less than 20 dB below the maximum spectral line (see Figure 1).

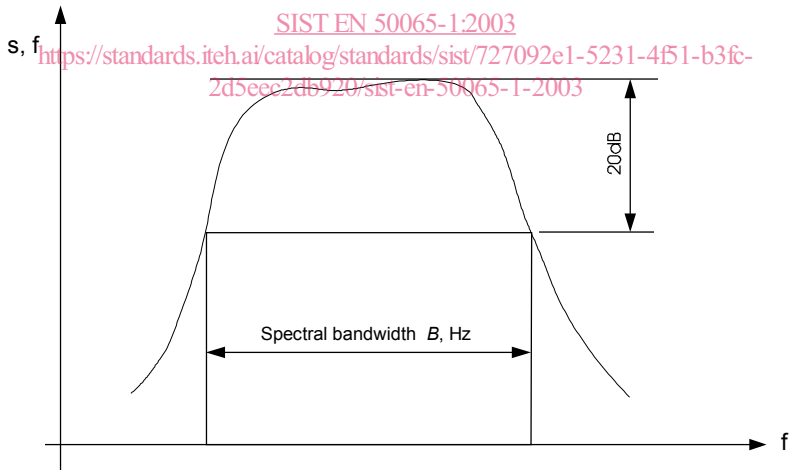


Figure 1 - Measurement of spectral bandwidth

6.2.2 *Determination of output level*

The output level is measured over a period of 1 minute using a peak detector. This measurement may be made by a spectrum analyser with a pass-band equal to or greater than the spectral bandwidth *B* of the transmitter output.

For single-phase devices, measurement shall be made on either the phase or neutral connection.

For three-phase devices that transmit on only a single phase, measurements shall be made on that phase and on the neutral connection.

For three-phase devices that transmit on all three phases simultaneously, measurements shall be made in all three phases. No measurement is required on the neutral conductor.

6.3 Maximum output levels

6.3.1 Single-phase Devices

6.3.1.1 *Sub-band 3 kHz up to 9 kHz*

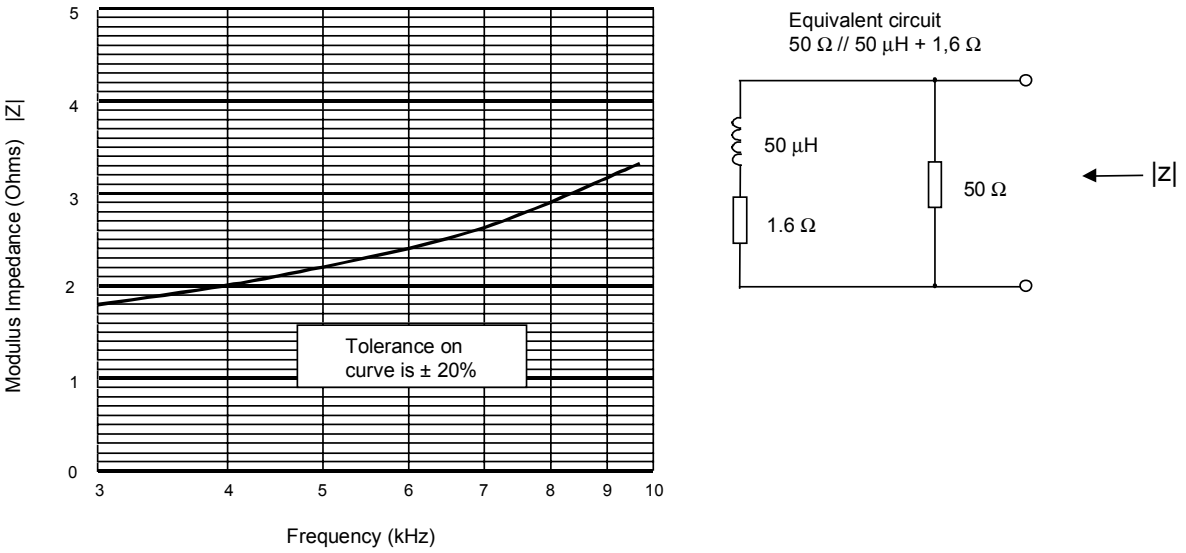
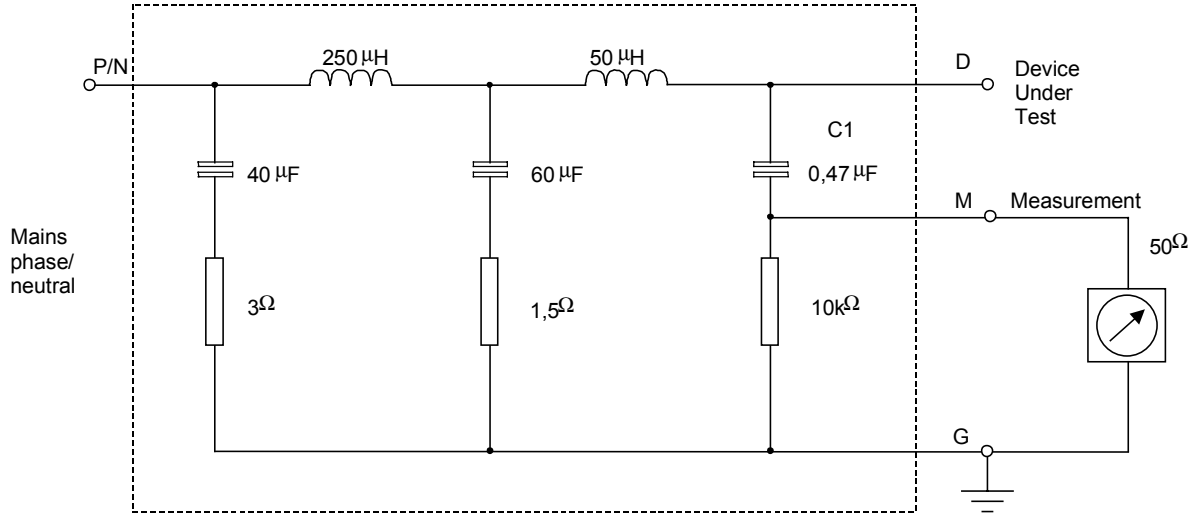


Figure 2 - Idealized equivalent circuit model - DUT port impedance

Measurements shall be made as defined in 6.2.2.

For the sub-band 3 kHz up to 9 kHz the artificial mains network 50 Ω//50 µH + 1,6 Ω shall be used. The idealised impedance curve is shown in Figure 2 and a practical implementation of the curve, including isolation from the supply, is shown in Figure 3.

NOTE This artificial network forms half of what is commonly known as a V-Network.



Network topology as CISPR 16-1:1993 figure 23
Values appropriate for 3 to 9 kHz sub-band

Figure 3 - Artificial mains network 3 kHz - 9 kHz