SLOVENSKI STANDARD
oSIST prEN 50065-1:2025

01-marec-2025

Signalizacija po nizkonapetostnih električnih napeljavah v frekvenčnem območju od 3 kHz do 526,5 kHz - 1. del: Splošne zahteve, frekvenčna območja in elektromagnetne motnje

Signalling on low-voltage electrical installations in the frequency range 3 kHz to 526,5 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: **prEN 50065-1:2025**

ICS:

33.040.30	Komutacijski in signalizacijski sistem	Switching and signalling systems
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general
91.140.50	Sistemi za oskrbo z elektriko	Electricity supply systems

oSIST prEN 50065-1:2025 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 50065-1

January 2025

ICS 33.040.30

Will supersede EN 50065-1:2011

English Version

Signalling on low-voltage electrical installations in the frequency range 3 kHz to 526,5 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 draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2025-04-18.

It has been drawn up by CLC/TC 219.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

Contents

Page

European foreword

This document (prEN 50065-1:2025) has been prepared by CLC/TC 219 “Mains communicating systems”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dav + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dav + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dav + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50065-1:2011 and all of its amendments and corrigenda (if any).

EN 50065-1:2025 includes the following significant technical changes with respect to EN 50065-1:2011:

This revision aligns EN 50065-1 with CENELEC Guide 24. It introduces requirements for signalling on low-voltage electrical installations in the frequency range 148,5 kHz to 526,5 kHz, specifies the use of the full band between 95 kHz and 148,5 kHz, and provides clarifications to the output signal voltage measurement method. A new normative annex consists of the adaptation of this document’s requirements for signalling in direct current electrical installations separated from the public electricity distribution network. A new normative annex specifies additional requirements applicable to MCE operated above 148,5 kHz up to 526,5 kHz. A new informative annex introduces a reference framework describing coexistence of different mains communicating systems operating simultaneously. Outdated material (safety considerations, application to electric vehicle charging systems) is withdrawn, as well as the limits for radiated disturbance power and the related measurement method (only disturbances’ field strength limits are kept). Finally, general clarifications and editorial enhancements are made throughout this document.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of this document.

EN 50065 consists of the following parts, under the general title *Signalling on low voltage electrical installations in the frequency range 3 kHz to 526,5 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

1 Scope

This document applies to mains communicating equipment (MCE) using signals in the frequency range 3 kHz to 526,5 kHz to transmit information on low voltage electrical systems, either on the public electricity distribution network, within installations in consumers' premises which are connected to the public electricity distribution network or within installations separated from the public electricity distribution network.

NOTE 1 Installations separated from the public electricity distribution network can be operated in DC. Typical applications include MCS communication between photovoltaic panels and inverters over a DC bus in photovoltaic power generating system. Requirements specific to such installations are given in Annex G.

It specifies the frequency bands allocated to the different applications as well as conducted and radiated emission limits, including conducted emission limits for the transmitter output signal voltage in the operating band. It also specifies the required measurement methods.

It does not specify modulation methods, coding methods or functional features (except those for the prevention of mutual interference).

Environmental requirements and tests are not included.

NOTE 2 Compliance with this document does not imply permission to establish communication with locations outside the consumer's installation or with other consumers through the public electricity distribution network where this would not otherwise be allowed.

MCE can fall into one of the following categories:

a) MCE implementing transmission or reception of information on low voltage electrical systems as the sole function. General requirements, frequency band allocation and emission limits applicable to such equipment are entirely covered by this document.

b) MCE being equipment within the scope of other standards, integrating mains communication as one of their functions. In this case, only the general requirements, frequency band allocation and emission limits for the mains communication function of such equipment are covered by this document. Requirements for all other available functions of this equipment are covered by the relevant product standard.

This document aims at contributing to EMC by limiting the mutual influence of different MCE or different mains communicating systems (MCS) operated in the same environment. In addition, this document is intended to limit interference caused by MCE signal transmission to general electrical equipment.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 55011:2016,[1] *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement (CISPR 11:2015)*

EN IEC 55016-1-1:2019, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus (CISPR 16-1-1:2019)*

EN 55016-1-2:2014,[2] *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements Ancillary equipment – Conducted disturbances (CISPR 16-1-2:2014)*

[1] As impacted by EN 55011:2016/A1:2017, EN 55011:2016/A11:2020 and EN 55011:2016/A2:2021.
[2] As impacted by EN 55016-1-2:2014/A1:2018.

EN IEC 55016-1-4:2019,[3] *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements (CISPR 16-1-4:2019)*

EN 55016-2-1:2014,[4] Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: methods of measurement of disturbances and immunity – Conducted disturbance measurements *(CISPR 16-2-1:2014)*

EN 55016-2-3:2017,[5] Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: methods of measurement of disturbances and immunity – Radiated disturbance measurements *(CISPR 16-2-3:2016)*

EN IEC 61000-6-3:2021, *Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments (IEC 61000-6-3:2020)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
application
use of a technology, system, or product

3.2
commercial or industrial premises
all premises other than residential premises

3.3
differential-mode signalling
form of signalling between two or more power conductors not requiring use of the protective conductor

3.4
electromagnetic compatibility
EMC
ability of equipment or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

3.5
mains communicating equipment
MCE
electrical equipment using mains power lines either on the public electricity distribution network or within installations of network users connected to the public electricity distribution network, for transmission and reception of information signals

[3] As impacted by EN IEC 55016-1-4:2019/A1:2020 and EN IEC 55016-1-4:2019/A2:2023.
[4] As impacted by EN 55016-2-1:2014/A1:2017.
[5] As impacted by EN 55016-2-3:2017/A1:2019 and EN 55016-2-3:2017/A2:2023.

3.6
mains communicating system
MCS
electrical system using mains power lines to transmit information signals, either on the public electricity distribution network or within installations of network users

[SOURCE: EN 61000-2-2:2002, 3.1.8]

3.7
residential
premises which are normally used as homes for persons

3.8
signalling
mains signalling voltage
signal superimposed on the mains voltage for the purpose of transmission of information either on the public electricity distribution network, within installations of network users or within installations separated from the public electricity distribution network

Note 1 to entry: Installations are considered to be separated from the public electricity distribution network if they are connected to the public electricity distribution network via a device providing an adequate level of attenuation over the frequency range covered by this document (such as a filter or an isolation transformer) or if they are supplied by a network which is independent from the public electricity distribution network.

4 Frequency bands and classifications

4.1 General

In order to provide coexistence between different applications and to prevent mutual interference, this document designates frequency bands for well-established application types.

NOTE Early drafts of this document, based upon existing industry documents and an existing national standard, used the terms A-band, B-band, C-band and D-band to designate the frequency bands 3 kHz to 95 kHz, 95 kHz to 125 kHz, 125 kHz to 140 kHz and 140 kHz to 148,5 kHz, respectively. Although these designations are not used in this document they remain widely used in industry for convenience. Where such designations are used, they are understood as above.

Additional mitigation measures, such as frequency separation and notching, reducing MCE transmission duty cycle, locally decreasing the output signal voltage levels, etc. can be implemented in the event of interference to radio services.

4.2 Band 3 kHz up to 95 kHz

Frequencies in this band shall only be used for applications for monitoring or controlling the low-voltage public electricity distribution network, including energy usage of equipment and premises connected to the low-voltage public electricity distribution network.

NOTE A typical example of an application in this band would be communications for metering.

4.3 Band above 95 kHz up to 148,5 kHz

4.3.1 General

Frequencies in this band shall only be used for:

a) Applications within homes, commercial or industrial premises;

b) Applications in networks external to premises and separated from the low-voltage public electricity distribution network with a transformer or an MCS blocking filter.

NOTE 1 Typical examples of a) would be home and building automation, load control, distributed energy resource management, submetering, prepayment via an in-home device and security systems. Typical examples of b) would be street lighting control and electric vehicle charging.

NOTE 2 Coexistence of different mains communicating systems and related mitigation measures are further described in Annex F.

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, while Class 134 equipment is not intended to be used in residential electrical installations or in locations with direct connection to residential installations.

4.3.2 Sub-band above 95 kHz up to 125 kHz

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

4.3.3 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.

4.3.4 Sub-band above 140 kHz up to 148,5 kHz

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

4.3.5 Full band above 95 kHz up to 148,5 kHz

Signalling in the full band from 95 kHz up to 148,5 kHz is possible and requires the use of the access protocol described in Clause 5.

4.4 Band above 148,5 kHz up to 526,5 kHz

Frequencies in this band may be used for:

a) Applications for monitoring or controlling the low-voltage public electricity distribution network, including energy usage of equipment and premises connected to the low-voltage public electricity distribution network;

b) Applications within homes, commercial or industrial premises;

c) Applications in networks external to premises and separated from the low-voltage public electricity distribution network with a transformer or an MCS blocking filter.

When different applications coexist in the same environment within this frequency band, MCS used for applications other than monitoring or controlling the low-voltage public electricity distribution network shall implement coexistence measures such as MCS blocking filters to ensure the correct operation of MCS on the low-voltage public electricity distribution network.

NOTE Coexistence of different mains communicating systems and related mitigation measures are further described in Annex F.

The use of this 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 and in the full band 95 kHz to 148,5 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 MCE 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”. MCE with pending transmissions might not transmit whilst the band is in use and until the band has been free for a minimum period.

To provide multiple access, MCE with pending transmissions are required to randomize their transmission attempts over a time interval to reduce the possibility of collisions between two or more transmissions. The most recent MCE 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 MCE shall use the frequency 132,5 kHz to indicate that a transmission is in progress.

To enable band-in-use to be detected, MCE output signals shall meet a spectral distribution in accordance with Annex B.

5.3 Band in use condition

Every MCE 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 MCE’s main input terminations and across the conductors used by the MCE’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 transmitters. 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 this clause differs from that described in Clause 4 and Annex A of EN 55016-1-2:2014.

5.4 Allowed use of the sub band above 125 kHz up to 140 kHz and of the full band above 95 kHz up to 148,5 kHz

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 consists of several MCE, 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 5.4 and 5.5 shall be met either by each transmitter individually or 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 MCE 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 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.