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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 Verträglichkeit

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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 50065-1:1991**

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EUROPEAN STANDARD

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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 3kHz 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 Première partie: 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 Verträglichkeit

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Up-to-date list 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.

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MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO
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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

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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.

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OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD

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

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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

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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.
However, frequencies in this band may be used for signalling in consumers' installations in cases and under conditions authorized by the electricity supplier.

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.

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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 1s 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.

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

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 (μV) 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 sub clause 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.

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6 TRANSMITTER OUTPUT VOLTAGE

6.1 Measuring Circuit

6.1.1 Differential Mode Transmitters

For any measuring method the output voltage is measured using an artificial network of (50 ohm/50μ H+ 5 ohm) conforming to sub-clause 8.2.1 of CISPR publication 16, second edition.

Note: In this case the measured output is 6dB below the true differential output.

6.1.2 Common Mode Transmitters

Under consideration.

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 100Hz 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.

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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 Fig 1)

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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.

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6.3 Maximum Output Levels

6.3.1 Band 3 kHz up to 9 kHz

under consideration

6.3.2 Band above 9 kHz up to 95 kHz

under consideration

6.3.3 Band above 95 kHz up to 148,5 kHz

The output level measured by the method of sub-clause 6.2.2 shall be limited according to the use of the equipment as follows:-

For general use - 116dB (μV)

Equipment that satisfies this output level limit is designated Class 116 equipment.

For particular application (eg industrial areas) - 134dB (μV)

Equipment that satisfies this output level limit is designated Class 134 equipment.

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Note: The use of Class 134 equipment may require prior notification to, or consent of, appropriate authorities.

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Marking

Transmitting equipment shall be marked to show its output level class.

7 DISTURBANCE LIMITS

The interference limits given below apply to frequencies outside the band, as listed in Sub-clauses 4.1.1, 4.1.2, 4.2.1, 4.2.2 and 4.2.3 in which the signalling equipment operates. The test conditions shall be those given in Clause 8. For the frequency range 9 kHz to 30 MHz the measuring receiver shall conform to CISPR Publication 16, second edition.

Note: The limits have been chosen to conform with limits already agreed or under discussion by CISPR to protect radio communication services.

7.1 Conducted Disturbance

7.1.1 Frequency Range 3 kHz to 9 kHz

Under consideration.

7.1.2 Frequency Range 9 kHz to 150 kHz

Decreasing linearly with the logarithm of frequency from 89 to 66 dB (μV) quasi peak.

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7.1.3 Frequency Range above 150 kHz up to 30 MHz

The limits for the interference measured with the quasi-peak detector and with the average detector are given in Table 1.

TABLE 1

Limits of mains terminal disturbance voltage in the frequency range 0,15 MHz to 30 MHz

Frequency range (MHz)	Limits [dB (μV)]	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

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The lower limit shall apply at the transition frequencies.

Note: The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz. These limits are shown diagrammatically in Fig 2.

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7.2 Limits of radiated disturbance field strength

The method of measurement shall be that described in CISPR Publication 16, Second edition, Section 3. The test unit shall meet the limits of Table 2. If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the highest reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

Table 2

Limits of radiated disturbance field strength in the frequency range 30 MHz to 1000 MHz at a test distance of 10 m

Frequency range (MHz)	Quasi-peak limits [dB (μV/m)]
30 to 230	30
230 to 1000	37

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The lower limit shall apply at the transition frequency.

Notes 1: If the field strength measurement at 10 m cannot be made because of high ambient noise levels or for other reasons, measurement may be made at a closer distance, e.g 3 m. In this case an inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

2: Additional provisions may be required for cases where interference occurs.

7.3 LIMITS OF DISTURBANCE POWER

As an alternative to the measurement of radiated field strength, disturbance power may be measured directly using an absorbing clamp. The method is described in Annex D.

The power shall not exceed the values given in table 3 below.

In the case of a dispute the radiated disturbance field strength and the limit of table 2 shall be the reference.

Table 3 : Limits of disturbance power

Frequency range (MHz)	Quasi-peak value dB (pW)	Average value dB (pW)
30 to 300	45 - 55 Increasing linearly with logarithm of frequency	35 - 45
300 to 1000	55	45

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7.4 Other Requirements to Limit Disturbance

Equipment to which other radio frequency disturbance requirements apply shall also meet these other requirements.

8 TEST CONDITIONS

8.1 Measurements of output and spurious output shall be made using the method described in Annex C with the equipment operating under the following conditions.

8.2 The measurements shall be made under the conditions that cause the maximum output or spurious output within the manufacturer's specification.

8.3 The equipment shall be supplied at its rated voltage. If the spurious output varies considerably with the supply voltage at any one value of frequency, tests shall be carried out varying the voltage between 0,9 to 1,1 times the rated voltage at a frequency in each frequency range.

Equipment with more than one rated voltage shall be tested at the rated voltage that causes the maximum output or spurious output.

8.4 During the test the mains signalling transmitter is activated to produce the signal for the test. Mains signalling transmitters that cannot be activated without another transmitter in circuit shall be connected as shown in Fig 3.