SLOVENSKI STANDARD
SIST EN 50065-4-1:2003

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Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz - Part 4-1: Low voltage decoupling filters - Generic specification

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Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz -- Teil 4-1: Niederspannungs-Entkopplungsfilter - Fachgrundspezifikation

Transmission de signaux sur les réseaux électriques basse tension dans la bande de fréquences de 3 kHz à 148,5 kHz -- Partie 4-1: Filtres basse tension de découplage - Spécification générique

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English version

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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.

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CENELEC
European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This draft European Standard was prepared by SC 205A, Mains communicating systems, of Technical Committee CENELEC TC 205, Home and Building Electronic Systems (HBES).

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50065-4-1 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- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-04-01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 and B are informative.

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

Introduction

Electrical networks, in spite of being a difficult medium for data communication due to signal attenuation, noise level and coupling side impedance, are considered as a potentially important transmission medium for supporting Distribution Automation and Home and Building Electronic Systems (HBES).

In order to avoid unwanted interference among mains communication equipment transmitting on low voltage networks, a suitable device called "decoupling filter" may be installed either on the public supply network or within installations in consumers' premises.

Decoupling filter is a generic name given, for example, to incoming filter, impedance filter, segmentation filter.

This decoupling filter may be incorporated in a more complex device where optional coupling functions are included (ref. Figure 1) according to signal propagation methods described in the informative annex A.

The decoupling filter may be used:

a) to limit the transmission area of wanted signals to the area in which the mains communication system operates.

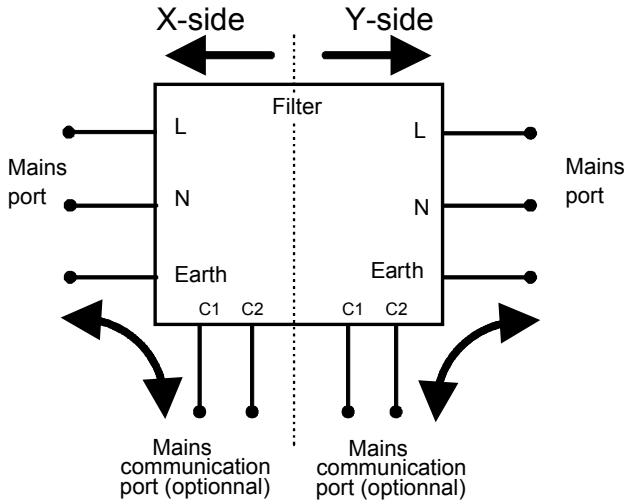
b) to reduce unwanted signals coming from the other side of the mains port.

c) to allow simultaneous communication on both sides of the filter.

d) to set a suitable impedance to the mains power ports at the signalling frequency.

e) to provide a return path for the signal when needed (e.g. common mode propagation).

A decoupling filter may perform all the functions listed above or some of them.



X	Y
Utility	Consumer
Utility	Utility (*)
Consumer	Consumer (*)
(*) in this case the filter may be reversed	

Figure 1 - Filter combined with other functions

1 Scope

This standard applies to decoupling filters installed on the low voltage mains network and operating in the frequency range 3 kHz to 148,5 kHz on low voltage mains network.

It does not apply to general purpose filters for EMI suppression.

It does not apply to protocol dependant devices except physical layer (frequency).

It does not apply to filters incorporated in household equipment for example: washing machines and coffee machines.

It specifies the impedance and the transfer function definitions, requirements and test methods of the decoupling filter and some other requirements for example Voltage Drop, Leakage Current and Form Factor.

The impedance and the transfer function are referred to the decoupling filter mains power ports (ref. Figure 1).

The use of the decoupling filter is considered optional; additional rules or obligations may exist that are outside the scope of this standard.

The safety requirements related to decoupling filters are not covered in this standard. They are covered in an other part of the EN 50065 set of standards

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).

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
EN 50065-4-2	Signalling on low voltage electrical installations in the frequency range 3 kHz to 148,5 kHz -- Part 4-2: Low voltage decoupling filters - Safety requirements
EN 60068-2-27	Basic environmental testing procedures -- Part 2: Tests - Test Ea and guidance: Shock (IEC 60068-2-27)
EN 60417-1	Graphical symbols for use on equipment -- Part 1: Overview and application (IEC 60417-1)
EN 60417-2	Graphical symbols for use on equipment -- Part 2: Symbol originals (IEC 60417-2)
EN 60617	Graphical symbols for diagrams (IEC 60617 series)

EN 60898	Circuit-breakers for overcurrent protection for household and similar installations (IEC 60898, modified)
EN 60947-5-1	Low-voltage switchgear and controlgear -- Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1)
EN 60950:2000	Safety of information technology equipment (IEC 60950:1999, modified)
EN 61140	Protection against electric shock - Common aspects for installation and equipment (IEC 61140)
IEC 60027	Letter symbols to be used in electrical technology (harmonized in HD 245 series)
IEC 60038:1983 A1:1994	IEC standard voltages
IEC 60050-161	International Electrotechnical Vocabulary (IEV) -- Chapter 161: Electromagnetic compatibility
IEC 80416	General principles for the formulation of graphical symbols
ISO 3744	Acoustical noise

3 Definitions

For the purposes of this standard the following definitions apply. Furthermore, the definitions of the International Electrotechnical Vocabulary IEC 60050-161 and EN 50065-1 apply.

3.1
decoupling filter
device installed in an electrical installation in order to make possible reliable data transmission over the low voltage mains network

3.2
nominal current of the decoupling filter
the maximum power frequency continuous current for which the decoupling filter is declared by the manufacturer to be suitable in defined conditions

3.3
nominal voltage of the decoupling filter
the maximum voltage (for three-phase supply, the voltage between phases) for which the decoupling filters is operated

NOTE The definition of IEC 60038/A1:1994 has been the basis for the present definition.

3.4
operating frequency range (fmin, fmax)
decoupling filters may operate in either of the frequency bands;
- utility band 3 to 95 kHz,
- consumer band 95 to 148,5 kHz.

Operating frequency range (fmin, fmax) for each side is a sub range of either of the frequency bands:
- for utility side : $f_{min} \geq 3$ kHz, $f_{max} \leq 95$ kHz;
- for consumer side : $f_{min} \geq 95$ kHz, $f_{max} \leq 148{,}5$ kHz;

3.5
decoupling filter impedance
the impedance of the decoupling filter, considered as a two port device, is defined as the impedance which can be measured on either side of the filter. The termination shall be specified R_{Load}

3.6
transfer function
the ratio between the output signal and the input signal, depending on the frequency with given load conditions

3.7
leakage current
an electric current which, under normal operating conditions, flows in an unwanted conducting path

3.8
voltage drop at 50 Hz
the difference between the RMS value of the input voltage and the RMS value of the output voltage at nominal current at 50 Hz

3.9
total harmonic distortion (THD)
the THD added by the filter, at the nominal supply frequency and current, due to non linear effects

3.10
power dissipation
power dissipation at the nominal current

3.11
overcurrent
current exceeding nominal current that can occur during fault condition until protective devices (e.g. circuit-breakers) operate

3.12.1
overvoltage
voltage exceeding nominal voltage that can occur during normal operation.

3.12.2
surge
surge voltage that can occur during normal operation due to lightning effects or opening/closing line equipment

3.13
mechanical shocks
Refers to EN 60068-2-27

3.14
acoustical noise
Refers to ISO 3744