SLOVENSKI STANDARD
SIST EN 50065-4-7:2006

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Signalizacija po nizkonapetostnih električnih napeljavah v frekvenčnem območju od 3 kHz do 148,5 kHz in 1,6 MHz do 30 MHz - 4-7. del: Prenosni nizkonapetostni ločilni filtri - Varnostne zahteve (vsebuje popravek AC:2006)

Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz and 1,6 MHz to 30 MHz -- Part 4-7: Portable low voltage decoupling filters - Safety requirements

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz und 1,6 MHz bis 30 MHz -- Teil 4-7: Bewegliche Niederspannungs-Entkopplungsfilter - Sicherheitsanforderungen

Transmission de signaux sur les réseaux électriques basse tension dans la bande de fréquences de 3 kHz à 148,5 kHz et de 1,6 MHz à 30 MHz -- Partie 4-7: Filtres portables basse tension de découplage - Exigences de sécurité

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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
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This 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 50065-4-7 on 2004-12-01.

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)	2006-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-12-01

This safety standard EN 50065-4-7 has no frequency dependent content.

It was originally conceived as a safety document within the EN 50065 set of standards, which have a frequency of 3 kHz to 148,5 kHz.

When the scope of SC205A was extended to 30 MHz, SC 205A agreed that the scope of the published safety standard, EN 50065-4-2, *Low voltage decoupling filters - Safety requirements*, should be amended to include the band 1,6 MHz to 30 MHz in order to cover the additional set of standards for 1,6 MHz to 30 MHz. This required no technical changes to the body of the document.

In addition, it was agreed that Part 4-7, *Portable low voltage decoupling filters - Safety requirements*, should also cover both frequency ranges. For this reason the title of this part of EN 50065 covers the extended frequency ranges 3 kHz to 148,5 kHz and 1,6 MHz to 30 MHz.

When certifying or making declaration of conformity to the Low Voltage Directive 73/23/EEC in order to CE mark the device it is important to state that the CE marking is only valid for the filter parts of the product. The plug parts and socket-outlets parts are not covered by the Low Voltage Directive and shall therefore comply with the relevant national standards.

Structure of EN 50065 series:

Reference	Title
EN 50065	Signalling on low voltage electrical installations in the frequency range 3 kHz to 148,5 kHz
EN 50065-1	Part 1: General requirements, frequency bands and electromagnetic disturbances
EN 50065-2-1	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
EN 50065-2-2	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
EN 50065-2-3	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
EN 50065-4-1	Part 4-1: Low voltage decoupling filters - Generic specification
EN 50065-4-2	Part 4-2: Low voltage decoupling filters - Safety requirements
EN 50065-4-3	Part 4-3: Low voltage decoupling filters - Incoming filter
EN 50065-4-4	Part 4-4: Low voltage decoupling filters - Impedance filter
EN 50065-4-5	Part 4-5: Low voltage decoupling filters - Segmentation filter
EN 50065-4-6	Part 4-6: Low voltage decoupling filters - Phase coupler
EN 50065-4-7	Part 4-7: Low voltage decoupling filters - Safety requirements
EN 50065-7	Part 7: Equipment impedance

The contents of the corrigendum of October 2006 have been included in this copy.

Contents

1 Scope

This European product safety standard applies to the filter part of portable devices for household and similar uses (hereafter referred to as portable decoupling filters) consisting of the filter part, a plug or an appliance inlet or a provision for connection by terminals or with a non-rewirable cord and one (multiple) socket-outlet or an appliance outlet. They are intended for single-phase circuits for nominal currents not exceeding 16 A and for nominal voltages not exceeding 250 V a.c. to neutral operating in the frequency range 3 kHz to 148,5 kHz and from 1,6 MHz to 30 MHz.

The filtering functions are described in EN 50065-4-1.

This standard does not cover phase couplers.

Portable decoupling filters shall not be used as part of the fixed installation, where EN 50065-4-2 applies.

Plugs and socket-outlets connected to the filter part and plugs and socket-outlets integrated with the filter part shall comply with the relevant national standard(s).

Appliance inlets and appliance outlets connected to the filter part shall comply with the relevant parts of the EN 60320 series. Appliance inlets and appliance outlets integrated with the filter parts are not covered by this standard.

This standard can be used for portable mains communication devices when no other product standard exists.

This standard can be used for other portable mains filters other than those described in EN 50065-4-1 when no other product standard exists.

Filters including batteries are not covered by this standard.

2 Normative references

The following referenced documents are indispensable for the application 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 60065	2002	Audio, video and similar electronic apparatus – Safety requirements (IEC 60065:2001, mod)
EN 60068-2-32		Environmental testing – Part 2: Tests – Test Ed: Free fall (IEC 60068-2-32)
EN 60068-2-75		Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests (IEC 60068-2-75)
EN 60112	2003	Method for the determination of the proof and the comparative tracking indices of solid insulating materials (IEC 60112:2003)
EN 60127	Series	Miniature fuses (IEC 60127)
EN 60320	Series	Appliance couplers for household and similar general purposes (IEC 60320)
EN 60529		Degrees of protection provided by enclosures (IP code) (IEC 60529)
EN 60664-1	2003	Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests (IEC 60664-1:1992 + A1:2000 + A2:2002)
EN 60664-3		Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution (IEC 60664-3)

EN 60695-2-11		Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (IEC 60695-2-11)
EN 60695-10-2		Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test (IEC 60695-10-2)
EN 60721-3-3		Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severity's – Section 3: Stationary use at weather protected locations (IEC 60721-3-3)
EN 60893-1		Insulating materials - Industrial rigid laminated sheets based on thermosetting resins for electrical purposes - Part 1: Definitions, designations and general requirements (IEC 60893-1)
EN 60999-1	2000	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm' up to 35 mm^2 (included) (IEC 60999-1:1999)
EN 61032		Protection of persons and equipment by enclosures – Probes for verification (IEC 61032)
EN 61140	2002	Protection against electric shock – Common aspects for installation and equipment (IEC 61140:2001)
EN 61180-1		High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements (IEC 61180-1)
EN 61180-2		High-voltage test techniques for low-voltage equipment – Part 2:Test equipment (IEC 61180-2)
EN 132400		Sectional Specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains (Assessment level D)
HD 21	Series	Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation (IEC 60227, mod)
HD 22	Series	Cables of rated voltages up to and including 450/750 V and having cross-linked insulation (IEC 60245, mod)
IEC 60085		Thermal evaluation and classification of electrical insulation
IEC 60417, database		Graphical symbols for use on equipment
IEC 60884-1	2002	Plugs and socket-outlets for household and similar purposes - Part 1: General requirements
IEC 60884-2-5	1995	Plugs and socket-outlets for household and similar purposes - Part 2: Particular requirements for adaptors

3 Definitions

For the purpose of this CENELEC standard, the following definitions apply.

Where the terms "voltage" and "current" are used, they imply r.m.s. values, unless otherwise specified.

Throughout this standard, the word "earthing" is used for "protective earthing".

The term "accessory" is used as a general term covering plugs and portable socket-outlets. The use of the accessories is shown in Figure 1a of IEC 60884-1.

3.1 Definitions (from IEC 60884-1) relating to plugs and socket-outlets

3.1.1
plug
accessory having pins designed to engage with the contacts of a socket-outlet, also incorporating means for the electrical connection and mechanical retention of flexible cables or cords

3.1.2
socket-outlet
accessory having socket-contacts designed to engage with the pins of a plug and having terminals for the connection of cable

3.1.3
portable socket-outlet
socket-outlet intended to be connected to, or integral with, flexible cables or cords, and which can easily be moved from one place to another while connected to the supply

3.1.4
multiple socket-outlet
combination of two or more socket-outlets

3.1.5
rewirable plug
accessory so constructed that the flexible cable or cord can be replaced

3.1.6
non-rewirable plug or a non-rewirable portable socket-outlet
accessory so constructed that it forms a complete unit with the flexible cable or cord after connection and assembly by the manufacturer of the accessory (see also 14.1 of IEC 60884-1)

3.1.7
moulded-on accessory
non-rewirable accessory, the manufacture of which is completed by insulating material moulded around pre-assembled component parts and the terminations of the flexible cable or cord

3.1.8
cord extension set
assembly consisting of one flexible cable or cord fitted with one plug and one portable socket-outlet

3.1.9
terminal
insulated or non-insulated connecting device intended for reusable electrical connection of the external conductors

3.1.10
termination
insulated or non-insulated connecting device intended for non -reusable electrical connection of the external conductors

3.1.11
clamping unit of a terminal
part or parts of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s)

3.1.12
adaptor
accessory constructed as an integral unit incorporating both plug pins and socket contacts
(IEC 60884-2-5)

3.2 Definitions related to decoupling filters

3.2.1
decoupling filter
a device which attenuates incoming or outgoing signals within a specified frequency range

3.2.2
intermediate adaptor
adaptor which has a decoupling filter incorporated

3.2.3
fault conditions
abnormal conditions which may occur during normal operation

3.2.4
screw-type terminal
a clamping unit for the connection and subsequent disconnection of one conductor or the interconnection and subsequent disconnection of two ore more conductors, the connection being made, directly or indirectly, by means of screws or nuts of any kind

3.2.5
nominal voltage
the voltage assigned to the filter device by the manufacturer

3.2.6
nominal current
the nominal maximum operating current assigned to the filter device by the manufacturer

3.3 Definitions from (EN 61140 and EN 60664-1) related to insulation

3.3.1
basic insulation
insulation applied to live parts to provide basic protection against electric shock

3.3.2
supplementary insulation
independent insulation applied in addition to the basic insulation in order to provide protection against electric shock in the event of a failure of the basic insulation (fault protection)

3.3.3
double insulation
insulation comprising both basic insulation and supplementary insulation

3.3.4
reinforced insulation
single insulation system applied to live parts which provides a degree of protection against electric shock equivalent to double insulation

NOTE The term "insulation system" does not imply that the insulation should be one homogeneous piece. It may comprise several layers which cannot be tested separately as supplementary or basic insulation.

3.3.5
functional insulation
insulation between live parts which is necessary only for the proper functioning of the filter part

3.3.6
solid insulation
insulation material interposed between two conductive parts

NOTE In the case of a printed board assembly with a coating, solid insulation consists of the printed board itself as well as the coating. In other cases, solid insulation consists of the encapsulating material.

4 General requirements

The portable filter devices including its accessories shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or the surroundings.

In general, compliance is checked by carrying out all the tests specified, where applicable.

5 General notes on tests

Tests according to this standard are type tests.

5.1 The samples are tested as delivered and under normal conditions of use, having regard to the classification of the filter device and to the manufacturer's installation instructions.

5.2 Unless otherwise specified, the tests are carried out in the order of the clauses at an ambient temperature of 20 °C ± 5 °C.

5.3 The required number of samples with filter portion shall be 9.

NOTE The number of samples with plug or socket-outlet parts shall be in accordance with the national standard(s). The number of samples with appliance coupler parts shall be in accordance with the EN 60320 standard(s).

Three samples are subjected to all the relevant tests, except the test of Clauses 27 and 28 where three other samples are used, and the tests of Clauses 29 and 30 where another three samples are used.

5.4 Filter device is deemed not to comply with this standard if any sample does not pass the tests of 25.1, 25.2, Clauses 29 and 30, and if there are more failures than that of one sample in any of the other tests.

If no sample has failed during the tests of 25.1, 25.2, Clauses 29 and 30, but one sample has failed in another way during any of the other tests, the test which caused the failure and those preceding which may have influenced the result of that test, are repeated on another set of samples, as specified in 5.4, all of which shall then comply with the repeated tests.

NOTE 1 In general, it will be necessary only to repeat the test that caused the failure, unless the sample fails in the mechanical strength test of Clause 21, in which case the ageing test of Clause 14 is repeated.

NOTE 2 The applicant may submit, together with the number of samples specified in 5.3, the additional set of samples, which may be required, should one sample fail. The testing laboratory will then, without further request, test the additional samples and will reject only if a further failure occurs. If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection.

6 Rating

6.1 Rated value of nominal voltages are 230 V.

6.2 Rated values of nominal currents are 10 A, 13 A and 16 A.

For a filter accessory, the rated current of the socket-outlet part shall not be higher than the rated value of the nominal current for the filter part and the plug part.

6.3 Rated cross-sectional areas of conductors are 0,75 mm², 1,0 mm² and 1,5 mm².

Compliance with the requirements of 6.1 to 6.3 is checked by inspection of the marking and the instruction sheet.

7 Classification of filter devices

7.1 According to protection against direct contact and external influences

The degrees of protection are based on EN 60529.

7.2 According to the degree of protection against ingress of water

The degrees of protection are based on EN 60529.

7.3 According to the type of connection

See Figure 1.

7.3.1 Intermediate adaptor

Filter incorporating one plug and one (multiple) socket-outlet.

7.3.2 Cord extension sets

7.3.2.1 The filter portion of which incorporates the plug at one end and one non-rewirable cord with one portable (single or multiple) socket-outlet at the other end.

7.3.2.2 The filter portion with one non-rewirable cable in both ends with one plug and one socket-outlet

7.3.2.3 The filter portion of which incorporates one portable (single or multiple) socket-outlet at one end and a non-rewirable cord with one plug at the other end.

7.3.3 Filter plugs

7.3.3.1 Filter incorporating one plug and a set of terminals

7.3.3.2 The filter portion plug for appliances: Filter incorporating the plug and equipped with one non-rewirable cord with or without one appliance coupler

7.3.4 In-line filters

7.3.4.1 Filter equipped, on the supply side, with one non-rewirable cord with one plug and, on the output side, with a set of terminals

7.3.4.2 Filter for appliances equipped, on the supply side, with one non-rewirable cord and one non-rewirable plug, and, on the output side, with one non-rewirable cord

7.3.4.3 Filter for appliances equipped, on the supply side, with one non-rewirable cord and one non-rewirable plug, and, on the output side, with one non-rewirable cord with a appliance connector

7.3.4.4 The filter portion of which is equipped on both sides with terminals

7.3.4.5 The filter portion of which is equipped on both sides with one non-rewirable cord and with or without on one side with an appliance inlet and on the other side with an appliance outlet

7.4 According to environmental temperature conditions

The classifications are based on EN 60721-3-3.

– class 3K4	+ 5 °C to + 40 °C	for indoor locations
– class 3K5	- 5 °C to + 45 °C	for unprotected indoor locations
– class 3K6	- 25 °C to + 55 °C	for outdoor locations

7.5 According to the rated impulse withstand voltage

The rated impulse withstand voltages are based on EN 60664-1:

– 2 500 V according to overvoltage category II, for filter parts with normal reliability;

– 4 000 V according to overvoltage category III; for filter parts with high reliability.

8 Marking

8.1 Plug and socket outlet parts

For plug and socket outlet parts, marking shall be in accordance with the relevant national standards.

8.2 Filter parts

As a minimum the filter parts shall be marked on the outside as follows:

a) nominal voltage(s) in volts ~;

b) nominal current in amperes;

c) manufacturer's or responsible vendor's name, trade mark or identification mark;

d) type of filter and reference or catalogue number;

e) symbol for temperature range, if different from class 3K4;

f) symbol for degree of protection, if higher than IP4X;

g) symbol for degree of protection against ingress of water, if higher than IPX0. In such case the symbol for degree of protection against harmful ingress of solid foreign bodies shall also be marked, even if not higher than IP4X.

8.3 Symbols

Symbols for marking shall be used as follows:

Amperes	A
Volt	V
Alternating current	~
Neutral	N
Protective earth	⏚
Degree of protection, when relevant	IPXX

The letter “X” shall be replaced by the relevant number.

The figure for the current rating shall be placed before or above that for the nominal voltage and separated from the latter by an oblique line or a dash.

The marking for the nature of the supply shall be placed after and next to the marking for nominal current and nominal voltage.

NOTE The marking for current, voltage and nature of supply may be, for instance, as follows: 16 A 230 V~ or 16/230~.

Compliance is checked by inspection.

8.4 Instruction sheets

An instruction sheet shall be provided with the following information when appropriate:

a) a statement concerning the national plug and socket-outlets system to which the portable decoupling filter belongs;

b) adequate instructions for safe connection of any appropriate flexible cords, including references to HD 21 and HD 22, the number and colour of cores, the minimum and maximum cross-sectional area of the conductors and the length, if necessary.

Compliance is checked by inspection.

8.5 Terminals

If it is necessary to distinguish between the supply and the load terminals, they shall be clearly marked (e.g. by "line" and "load" placed near the corresponding terminals or by arrows indicating the direction of power flow).

The letter ”N” shall indicate terminals exclusively intended for the connection of the neutral circuit.

Terminals intended for the protective conductor shall be indicated by the symbol  (IEC 60417-5019).

These markings shall not be placed on screws or any other easily removable parts.

NOTE "Easily removable parts" are those parts, which can be removed during the normal connection of the filter device.

A marking scheme is given in Table 1.

Table 1 – Symbols for identification of the terminals

Single phase	
Point of connection	**Identification**
Line	L
Neutral	N
Earth	 IEC 60417, symbol 5019

Terminals associated with any one pole shall have similar identification differing from that of the terminals associated with the other poles, unless the relationship is self-evident.

Compliance is checked by inspection.

8.6 Durability

Marking shall be durable and easily legible.

Compliance is checked by inspection and by the following test.

The test is made by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

Marking made by impression, moulding, pressing or engraving is not subjected to this test.

NOTE 1 The petroleum spirit used should consist of a solvent hexane with a content of aromatics of maximum 0,1 % by volume, a value of 29 % for kauri-butanol, an initial boiling-point of approximately 65 °C, a dry-point of approximately 69 °C and a density of approximately 0,68 g/cm³.

NOTE 2 The type reference may be marked with paint or ink, protected, if necessary, by varnish.

9 Dimensions

Plug and socket outlet parts shall comply with the appropriate national standard sheets.

Compliance is checked by inspection, by test, by measurement and by use of gauges according to the appropriate national standards.

10 Protection against electric shock

10.1 For plug and socket outlet parts, tests shall be performed in accordance with the relevant national standards.

The tests below apply to all other filter parts.

10.2 The filter devices shall be so designed that live parts are not accessible when the filter device is mounted and wired as for normal use, even after removal of parts, which can be removed without the aid of a tool.

For filter parts with plug without earth connection, this requirement applies also to contact with metal parts separated from live parts by basic insulation only, or with basic insulation itself.

Compliance is checked by inspection and, if necessary, by the following tests.

The sample is connected as in normal use and fitted with conductors of the smallest cross-sectional area specified in Clause 12. The test is repeated using conductors of the largest cross-sectional area specified in Clause 12.

The standard test finger specified in EN 60529 is applied to the sample in every possible position, an electrical indicator, with a voltage not less than 40 V and not more than 50 V, being used to show contact with the relevant live parts.

The insulating properties of lacquer, enamel, paper, cotton, oxide film on metal parts, beads and sealing compounds which soften in heat shall not be relied upon to give the required protection against contact with live parts.

Openings in insulating material and in unearthed metal parts are tested with the test probe 13 according to EN 61032. The test probe shall without force in every possible position not touch live parts.

Devices, having enclosures or covers in thermoplastic or elastomeric material, is subjected to the following additional test, which is carried out at an ambient temperature according to the maximal temperature specified under the environmental classification ± 2 °C.

The devices shall be connected as in normal use at this temperature and preheated with the nominal current and voltage connected for at least one hour.

During this additional test, the filter device is subjected for 1 min to a force of 75 N, applied through the tip of a straight unjointed test finger of the same dimensions as the standard test finger.

This test finger, with an electrical indicator as described above, is applied to all places where yielding of insulating material could impair the safety of the filter device.

During this test, the filter device with its associated mounting means shall not deform to such an extent that live parts can be touched by the unjointed test finger.

10.3 Accessible parts shall be of reinforced or double insulated solid insulation with the exception of small screws and the like which are isolated from live parts and which are used for fixing cover plates. However accessible parts may be made of metal if the requirements of either 10.3.1 or 10.3.2 are fulfilled.