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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

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EUROPEAN STANDARD **EN 50065-4-2**

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English version

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

Transmission de signaux sur les réseaux électriques basse tension dans la bande de fréquences de 3 kHz à 148,5 kHz Partie 4-2: Filtres basse tension de découplage - Exigences de sécurité

Signalübertragung auf elektrischen Niederspannungsnetzen im Frequenzbereich 3 kHz bis 148,5 kHz Teil 4-2: Niederspannungs-Entkopplungsfilter - Sicherheitsanforderungen

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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.

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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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).

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and covers the essential requirements of the Low Voltage Directive 73/23/EEC.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50065-4-2 on 2000-11-01.

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- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-11-01

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

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1 Scope

This product safety standard applies to electrical equipment, such as decoupling filters and phase couplers in a mains communication system for a phase to neutral voltage not exceeding AC 250 V and a nominal current not exceeding 125 A, intended for household and similar fixed-electrical installations including residential, commercial and light industrial buildings

2 Normative references

This European Standard incorporated 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 updated references the latest edition of the publication referred to applies.

EN 60065		Audio, video and similar electronic apparatus – Safety requirements (IEC 60065)
EN 60068-2-75	1997	Environmental testing – Part 2-75: Tests – Test Eh Hammer tests (IEC 60068-2-75:1997)
EN 60127	series	Miniature fuses (IEC 60127 series)
EN 60417	series	Graphical symbols for use on equipment (IEC 60417 series)
EN 60529		Degrees of protection provided by enclosures (IP code) (IEC 60529)
EN 60669-1	1999	Switches for household and similar fixed electrical installations – Part 1: General requirements (IEC 60669-1:1998, mod.)
EN 60695-2-1/X	1996	Fire hazard testing - Part 2: Test methods (IEC 60695-2-1/X:1994)
EN 60721-3-3	1995	Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weather protected locations (IEC 60721-3-3:1994)
EN 60999-1	2000	Connecting devices – Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors – Part 1: General requirements and particular requirements for conductors from 0,5 mm^2 up to 35 mm^2(included) (IEC 60999-1:1999)
EN 132400	1994	Sectional Specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains (Assessment level D)
HD 214 S2	1980	Method of determining the comparative and the proof tracking indices of solid insulating materials under moist conditions (IEC 60112:1979)
HD 384.4.442 S1	1997	Electrical installations of buildings – Part 4: Protection for safety – Chapter 44 Protection against overvoltages - Section 442: Protection of low-voltage installations against faults between high-voltage systems and earth (related to IEC 60364-4-442:1993 + A1:1995)
HD 625.1 S1	1996	Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests (IEC 60664-1:1992, mod.)
IEC 60695–10-2	1995	Fire hazard testing – Part 10: Guidance and test methods for the minimisation of the effects of abnormal heat on electrotechnical products involved in fires – Section 2 Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test

IEC 60999-2 1995 Connecting devices – Safety requirements for screw-type and screw-less clamping units for electrical copper conductors – Part 2: Particular requirements for conductors from 35 mm^2 up to 300 mm^2

3 Definitions

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

For the purpose of this standard, the following definitions apply:

3.1
decoupling filter
a device which attenuates incoming or outgoing signals within a specified frequency range

3.2
phase coupler
a device which transmits a signal within a specified frequency range from one phase to another in a multi-phase installation

3.3
fault conditions
abnormal conditions which may occur during normal operation

3.4
enclosed equipment
equipment which is mounted and/or applied without an additional enclosure

3.5
unenclosed equipment
equipment intended to be built into an enclosure which completely covers the equipment

3.6
partly enclosed equipment
equipment intended to be built into an appropriate enclosure which only covers the unenclosed part of the equipment

NOTE Flush-mounted equipment intended to be located in a box is an example of such equipment.

3.7
terminal
the conductive part of one pole, composed of one or more clamping unit(s) and insulation if necessary

3.8
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

3.9
screwless-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 other than screws

3.10
nominal voltage
the voltage assigned to the equipment by the manufacturer

3.11
nominal current
the nominal maximum operating current assigned to the equipment by the manufacturer

3.12
conditional short-circuit current
a value of the AC component of a prospective current, which the equipment protected by a suitable short-circuit protective device (hereafter referred to as SCPD) in series can withstand under specified conditions of use and behaviour.

4 General requirements

Equipment and its enclosures 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 equipment 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 shall be 9.

Three samples are subjected to all the relevant tests, except the test of clauses 23 and 24 where three other samples are used, and the tests of clauses 25 and 26 where another three samples are used.

5.4 Equipment is deemed not to comply with this standard if any sample does not pass the tests of 21.1, 25 and 26, 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 21.1, 25 and 26, 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 17, 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 5.4, 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 Standard values of nominal voltages are AC 230 V and AC 400 V.

If a different nominal voltage is applied this value shall not be less than 220 V.

6.2 Standard values of nominal currents are 10 A, 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A and 125 A.

6.3 Standard cross-sectional areas of conductors are 1,5 mm², 2,5 mm², 4 mm², 6 mm², 10 mm², 16 mm², 25 mm², 35 mm² and 50 mm²

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

7 Classification

7.1 Equipment is classified as follows:

7.1.1 According to protection against direct contact and external influences:

– enclosed equipment (minimum IP2X) for separate mounting;

– unenclosed equipment for mounting in an adequate enclosure.

NOTE 1 The degrees of protection are based on EN 60529.

NOTE 2 For unenclosed the protection against electric shock is given by the enclosure in which the equipment is intended to be mounted. For enclosed equipment, the protection against electric shock is provided by compliance with the requirements of clause 10.

7.1.2 According to the degree of protection against ingress of water:

The degrees of protection are based on EN 60529.

7.1.3 According to the method of mounting

– surface-type equipment;

– flush-type equipment;

– panel board equipment.

7.1.4 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
– class 3K8H	- 25 °C to + 70 °C	for severe environments

7.1.5 According to the rated impulse withstand voltage

The rated impulse withstand voltages are based on HD 625.1.

- 4000 V according to overvoltage category III;
- 6000 V according to overvoltage category IV.

8 Marking

8.1 As a minimum the equipment shall be marked with:

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 or phase coupler and reference or catalogue number;

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

f) symbol for degree of protection, if higher than IP2X;

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 IP2X.

h) marking with conditional short-circuit current and suitable SCPD shall be given in the manufacturer's catalogues

8.2 Symbols for marking shall be used as follows:

Amperes	A
Volt	V
Alternating current	~
Degree of protection against moisture	IPX4 or IPX5
	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.

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

8.3 The manufacturer's or responsible vendor's name, trademark or identification mark, type reference and nominal current shall be on the main part of the equipment.

Parts such as cover plates, which are necessary for safety purposes and are intended to be sold separately, shall be marked with the manufacturer's or responsible vendor's name, trade mark or identification mark and type reference.

The symbol for degree of protection, if applicable, shall be marked on the outside of its associated enclosure so as to be easily discernible when the equipment is mounted and wired as in normal use.

NOTE 1 Additional type references may be marked on the main part, or on the outside or the inside of the associated enclosure.

NOTE 2 The term "main" part means the part carrying the terminals and any part integral with them; it does not include parts intended to be sold separately.

8.4 Terminals

The side name (Input side, output side) and the respective termination shall be marked, when appropriate, in such a way that they are clearly distinguished (e.g. using a different colour for each side).

These indications 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 installation of the equipment.

For example a typical marking scheme is given in Table 1.

Table 1 - Symbols for identification of the termination

Single phase		Three phase	
Point of connection	**Identification**	**Point of connection**	**Identification**
Line	L	1st Phase 2nd Phase 3rd Phase	L1, L2, L3
Neutral	N	Neutral	N
Earth	EN 60417 Symbols 5019	Earth	EN 60417 Symbols 5019
Communication 1 Communication 2	C1 C2	Communication 1 Communication 2	C1 C2

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.

8.5 Terminals shall additionally be marked in accordance with 7.4 in EN 60999-1.

Compliance is checked by inspection.

8.6 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 vanish.

8.7 The correct installation and use of the equipment shall be indicated in an installation instruction delivered with the equipment. A phase coupler shall be delivered with a marking plate with the following text:

Phase Coupler !
Must be disconnected while working on the installation.

The marking plate shall be fastened to the panel board in which the phase coupler is installed.

The installation instruction and the text of the marking plate shall be written in the official language(s) of the country in which the equipment is to be sold.

Compliance is checked by inspection.

NOTE In the following country the marking plate is not necessary: Germany.

9 Dimensions

Equipment shall comply with the appropriate standard sheets.

Compliance is checked by inspection and by measurement.

10 Protection against electric shock

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

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

The sample is mounted 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 part.

Equipment, 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 equipment shall be installed 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 equipment 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 equipment. The test is not made on membranes. A force of only 10 N is applied to thin-walled knock-outs.

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

NOTE Membranes are tested according to 14.4.1 only.

10.2 Accessible parts shall be of insulating material with the exception of small screws and the like which are isolated from live parts and which are used for fixing bases or cover plates.

However accessible parts may be made of metal if the requirements of either 10.2.1 or 10.2.2 are fulfilled.

10.2.1 Covers or cover plates shall be separated from live parts by supplementary insulation, made by insulating linings or insulating barriers fixed to the covers or cover plates, or to the body of the equipment in such a way that this supplementary insulation

– cannot be removed without being permanently damaged, or

– is so designed that it cannot be replaced in an incorrect position and that, if they omitted, the equipment is rendered inoperable or manifestly incomplete. There shall be no:

  – risk of accidental connection between live parts and metal covers or cover plates, for example through their fixing screws, even if a conductor should come away from its terminal,

  – risk of a reduction of creepage distances or clearances below the values specified in clause 20.

10.2.2 Accessible conductive parts, which are not separated from live parts by supplementary insulation, made by insulating linings or insulating barriers, shall be permanently and reliably connected to the protective earth terminal.

Compliance with 10.2.1 and 10.2.2 is checked by inspection and by the tests of clauses 15 and 20. For 10.2.2 the additional requirements in clause 11 shall be tested.

NOTE Insulating coating sprayed on the inside or on the outside of the metal covers or cover plates is not deemed to be an insulating lining or barrier for the purpose of this subclause.

11 Provision for protective earthing

11.1 Earthing terminals shall be terminals with screw clamping or with other means of comparable effectiveness and shall comply with the appropriate requirements of clause 12.

They shall be of the same size as the corresponding terminals for the supply conductors except that any additional external earthing terminal shall be of a size suitable for conductors of at least 6 mm².