

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage power supplies, d.c. output –
Part 3: Electromagnetic compatibility (EMC)**

**Alimentations basse tension, sortie continue –
Partie 3: Compatibilité électromagnétique (CEM)**

<https://standards.iteh.ai/catalog/standards/sist/50bc83d-d923-4d8b-82b3-08079a394fe9/iec-61204-3-2011>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2011 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage power supplies, d.c. output –
Part 3: Electromagnetic compatibility (EMC)**

**Alimentations basse tension, sortie continue –
Partie 3: Compatibilité électromagnétique (CEM)**

<https://standards.iteh.ai/catalog/standards/sist/50bc83d-d923-4d8b-82b3-08079a394fe9/iec-61204-3-2011>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

W

ICS 29.200; 33.100

ISBN 978-2-88912-510-4

CONTENTS

FOREWORD.....	4
1 Scope and object.....	6
1.1 Scope.....	6
1.1.1 Equipment covered by this standard.....	6
1.1.2 Additional requirements.....	6
1.1.3 Exclusions.....	6
1.1.4 Types of power supply.....	7
1.2 Object.....	7
2 Normative references.....	7
3 Terms and definitions.....	9
4 Applicability of tests to different PSU technologies.....	13
5 General requirements and test conditions.....	13
5.1 General requirements.....	13
5.2 Test conditions.....	13
6 Emission requirements.....	13
6.1 Low frequency phenomena ($f \leq 9$ kHz; a.c. input only).....	14
6.1.1 Commutation notches.....	14
6.1.2 Current harmonics and interharmonics.....	14
6.1.3 Voltage fluctuations and flicker.....	14
6.2 High frequency conducted emission.....	15
6.2.1 High frequency conducted emission for input power ports.....	15
6.2.2 High frequency conducted emission for d.c. output power ports.....	15
6.3 High frequency radiated emission.....	15
6.3.1 Radiated disturbance measurements.....	15
6.3.2 Measurement of disturbance power.....	16
6.3.3 Restrictions for the application of interference power measurement.....	17
7 Immunity requirements.....	17
7.1 Performance criteria.....	17
7.2 Basic immunity requirements, high frequency disturbances.....	18
7.2.1 Immunity level for residential, commercial, and light industrial environment.....	18
7.2.2 Immunity level for industrial environment.....	21
8 Configurations and combinations of power supplies.....	24
8.1 Modular PSUs.....	24
8.2 Power supply systems.....	24
8.3 Power supply installations.....	25
8.4 Distributed power supplies.....	25
8.5 Power supplies in parallel or in series.....	25
9 Power supply families.....	25
10 Statistical aspects.....	25
11 Safety aspects.....	25
12 Test report.....	26
Annex A (normative) Guidelines on the classification of PSUs.....	27
Annex B (informative) Commutation notches.....	29
Annex C (informative) Calculation and simulation of the input current harmonics.....	30

Annex D (informative) Special considerations for d.c./d.c. converters.....	31
Annex E (informative) Critical frequency for high frequency power measurement	33
Annex F (normative) Guidelines on power supply families	34
Annex G (informative) Summary of classification of environments and limits	35
Annex H (normative) Emission limits	37
Bibliography	39
Figure 1 – Test set-up for the measurement of disturbance power	17
Table 1 – Criteria to prove the performance of a PSU against EM disturbances	18
Table 2 – Immunity – Enclosure port – Residential, commercial and light industrial environment.....	19
Table 3 – Immunity – Ports for signal lines and control lines	19
Table 4 – Immunity – DC input and output power ports	20
Table 5 – Immunity – AC input power ports – Residential, commercial and light industrial environment.....	21
Table 6 – Immunity – Enclosure port – Industrial environment.....	22
Table 7 – Immunity – Ports for signal lines and control lines – Industrial environment	22
Table 8 – Immunity – DC input and output power ports – Industrial environment	23
Table 9 – Immunity – AC input power ports – Industrial environment.....	24
Table A.1 – Classification of power supplies and the relevant EMC standards	28
Table D.1 – Immunity – DC input power ports – Input category a.....	31
Table D.2 – Immunity – DC input power ports – Input category b.....	32
Table D.3 – Immunity – Enclosure port – Input categories a and b	32
Table H.1 – Limits of mains terminal disturbance voltage (a.c. input port)	37
Table H.2 – Limits of mains terminal disturbance voltage (d.c. input and d.c. output power port)	37
Table H.3 – Limits for electromagnetic radiation/interference power disturbance (all field strength limits refer to quasi-peak measurements).....	38
Table H.4 – Disturbance power limits for the frequency range 30 to 300 MHz.....	38

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE POWER SUPPLIES, D.C. OUTPUT –

Part 3: Electromagnetic compatibility (EMC)

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61204-3 has been prepared by subcommittee 22E: Stabilized power supplies, of IEC technical committee 22: Power electronic systems and equipment.

IEC 61204-3 has the status of a product family standard.

This second edition cancels and replaces the first edition, published in 2000. It constitutes a technical revision.

The main changes with respect to the previous edition are listed below.

- Update of the scope to align with IEC 61204-7.
- Update of the normative references to the latest editions.
- Change of the definitions of environments to align with the latest editions of the applicable normative references.
- Revision of the applicability of tests to different power supply technologies.

- Revision of the emission limits and requirements to align with the latest editions of the applicable normative references.
- Revision of the immunity limits and requirements to align with the latest editions of the applicable normative references.
- Clarification of the different classes of PSU.

The text of this standard is based on the following documents:

FDIS	Report on voting
22E/129/FDIS	22E/130/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 61240 series, under the general title *Low voltage power supplies, d.c. output*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

<https://standards.iteh.ai/catalog/standards/sist/b90bc83d-d923-4d8b-82b3-08079a394fe9/iec-61204-3-2011>

<https://standards.iteh.ai/catalog/standards/sist/b90bc83d-d923-4d8b-82b3-08079a394fe9/iec-61204-3-2011>

LOW-VOLTAGE POWER SUPPLIES, D.C. OUTPUT –

Part 3: electromagnetic compatibility (EMC)

1 Scope and object

1.1 Scope

1.1.1 Equipment covered by this standard

This part of IEC 61204 specifies electromagnetic compatibility (EMC) requirements for power supply units (PSUs) providing d.c. output(s) with or without auxiliary a.c. output(s), operating from a.c. or d.c. source voltages up to 600 V a.c. or 1 000 V d.c. (see exceptions under 1.1.3.)

NOTE Ringing generators used in telecoms applications are covered by this standard.

This product standard covers both stand alone and component power supply units as defined in this standard. It covers PSU units for use in or with IT equipment normally covered by IEC 60950-1:2001¹ and/or IEC 60950-1:2005; PSU units for use in or with measurement, control and laboratory equipment normally covered by IEC 61010-1; PSU units for use in or with medical equipment – normally covered by IEC 60601-1; PSU units for use in or with audio, video and similar electronic apparatus – normally covered by IEC 60065. It also covers d.c. power and distribution equipment and d.c./d.c. converters.

Where no standard exist, use of this standard for other applications is not precluded.

1.1.2 Additional requirements

Requirements additional to those specified in this standard may be necessary for

- PSUs intended for operation in special environments (for example, extremes of temperature; excessive dust, moisture or vibration; flammable gases; and corrosive or explosive atmospheres);
- PSUs intended to be used in vehicles, on board ships or aircraft, or in tropical countries;
- PSUs intended for use where ingress of water is possible.

NOTE Attention is drawn to the fact that authorities in some countries impose additional requirements for health, environmental and similar reasons.

1.1.3 Exclusions

This standard does not apply to

- motor-generator sets;
- uninterruptible power supplies (UPS) to IEC 62040-1-1;
- PSUs covered by IEC 61558-1 (i.e. power supply units incorporating safety isolating transformers providing SELV or PELV output(s) in accordance with IEC 60364-4-41 and PSUs for use with household and other consumer products, except those covered by IEC 60065 and IEC 60950-1:2001 and/or IEC 60950-1:2005;
- transformers covered by IEC 61558-1;
- step-down converters covered by IEC 60146-1-1;
- PSUs and converters for use with or in products covered by IEC 61347-2-2.

¹ This publication has been withdrawn and replaced by the second edition issued in 2005.

1.1.4 Types of power supply

Two types of power supplies are covered by this standard:

a) stand alone (or end-product) power supplies

Power supplies intended for free-standing operation (individual apparatus).

This part of IEC 61204 is applicable to PSUs developed as a unit with a direct function and sold on the market as a stand-alone unit.

b) component power supplies

These can be divided into two categories:

1) component power supplies considered as equivalent to stand alone power supplies (apparatus).

This part of IEC 61204 is applicable to this category of component PSUs. These PSUs are considered to be apparatus with respect to their EMC requirements, for example those PSUs intended for use in installations or sold to the general public, cases where no further EMC tests are anticipated. This does not include PSUs sold as spares for repair which have been tested as part of an overall equipment.

2) component power supplies intended for a professional installer

This part of IEC 61204 is applicable to this category of power supplies only as an aid to specify relevant EMC requirements in order that various end-product standards may be met.

These are component power supplies that are intended for incorporation into a final product by a professional installer. These products may be sold to a professional installer or placed on the market for specialized distribution and use. In neither case do they perform in themselves a direct function for the user of an end-product. Further EMC tests of the assembly are assumed.

NOTE After incorporation into a final product, the emission values can be altered (e.g. because of modified earth connections).

1.2 Object

The object of this part of IEC 61204 is to define EMC limits and test methods for PSUs. It includes limits for electromagnetic emissions which may cause interference to other electronic equipment (e.g. radio receivers, measuring and computer devices), as well as electromagnetic immunity limits for continuous and transient conducted and radiated disturbances including electrostatic discharges.

This part of IEC 61204 defines the minimum electromagnetic compatibility requirements for PSUs.

To comply with this part of IEC 61204, no additional EMC tests are required or necessary beyond those stated here.

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.

IEC 60050-121, *International Electrotechnical Vocabulary (IEV) – Part 121: Electromagnetism*

IEC 60050-131, *International Electrotechnical Vocabulary (IEV) – Part 131: Circuit theory*

IEC 60050-151, *International Electrotechnical Vocabulary (IEV) – Part 151: Electrical and magnetic devices*

IEC 60050-161, *International Electrotechnical Vocabulary (IEV) – Part 161: Electromagnetic compatibility*

IEC 60050-551, *International Electrotechnical Vocabulary (IEV) – Part 551: Power electronics*

IEC 60065, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60146-1-1, *Semiconductor converters – General requirements and line commutated converters – Part 1-1: Specifications of basic requirements*

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60601-1, *Medical electrical equipment – Part 1: General requirements for basic safety and essential performance*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤ 75 A and subject to conditional connection*

IEC 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measuring techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61010-1, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*

IEC 61204, *Low-voltage power supply devices, d.c. output – Performance characteristics*²

IEC 61347-2-2, *Lamp controlgear – Part 2-2: Particular requirements for d.c. or a.c. supplied electronic step-down converters for filament lamps*

IEC 61558-1, *Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests*

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 14-1, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

CISPR 16-1 (all parts), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

CISPR 16-1-2:2004, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*

CISPR 16-1-3, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-3: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Disturbance power*

CISPR 16-2-1:2008, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR 16-2-2, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-2: Methods of measurement of disturbances and immunity – Measurement of disturbance power*

CISPR 16-2-3, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purpose of this part of IEC 61204, the terms and definitions given in IEC 60050-121, IEC 60050-151, IEC 60050-161, IEC 60050-551 and IEC 60146-1-1, as well as the following apply.

² Future IEC 61204-2.

3.1 environment

3.1.1

residential, commercial and light industrial environment

environment encompassed by the generic standard IEC 61000-6-3. An indication of the locations included by this environment is given in Annex G

3.1.2

industrial environment

environment encompassed by the generic standard IEC 61000-6-4. An indication of the locations included by this environment is given in Annex G

3.2

protection distance

distance for an electronic or electrical apparatus beyond which the interference levels shall not impair the use of other electronic or electrical equipment, for example broadcast radio and television receivers

3.3

distributed power system

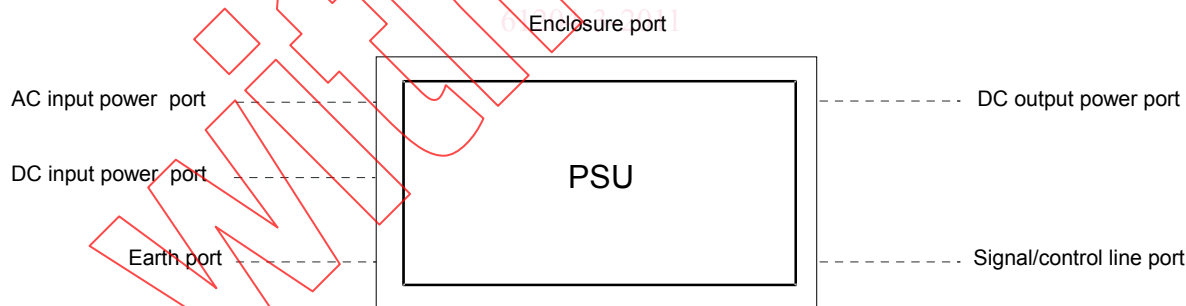
system of localized power converters supplied from a distributed power bus

3.4 port

particular interface of a product with the external electromagnetic environment.

[IEC 60050-131:2002, 131-02-21 modified]

Examples of ports:



IEC 1116/11

3.4.1

enclosure port

physical boundary of the PSU product through which and on which electromagnetic fields may radiate or impinge

3.4.2

signal or control line port

low energy level input or output port providing diagnostic or control information

3.4.3

d.c. input power port

external d.c. energy source connection point

3.4.4**d.c. output power port**

external connection point for providing output d.c. energy

3.4.5**a.c. input power port**

external a.c. energy source connection point

3.5**power supply (PSU)**

an electrical or electronic device which transforms energy from an input source into a single or multiple output energy source

3.5.1**component power supply**

modular PSU; sub-unit PSU

assemblies of electrical and/or electronic devices designed to provide or modify energy. They are intended for incorporation into end-products by a professional installer. They are not intended for free-standing applications

3.5.2**stand alone power supply**

intended for use in laboratories, workshops and other areas in free-standing applications. They are end-products, completely enclosed with full protection against electrostatic discharge and contact with hazardous parts which are accessible to the end-user. Typical examples include adjustable or fixed output bench-top units, plug-top units, free-standing and wall-mounted units

3.5.3**bench-top power supply**

intended for laboratory or similar use. They are stand alone PSUs, sometimes with monitoring and measuring facilities

3.5.4**open card power supply**

frameless PSU

printed circuit board devoid of a metal mounting bracket. It is a component PSU intended for use by an installer

3.5.5**open frame power supply**

generally uses a printed circuit board mounted on a metal bracket for attachment to the professional installer's equipment chassis. This bracket provides heat transfer for the cooling of power semiconductors. Optionally, a cover may be used for safety reasons and/or to reduce radiated interference

3.5.6**plug-in card power supply**

intended to be plugged into a subrack. The design may be "open-card", "open-frame" or "cased". A plug-in card PSU is generally intended for use by a professional installer

3.5.7**enclosed/cased power supply**

fully enclosed/cased/housed PSU. The design uses the housing as a heat sink or employs fan(s) for forced air cooling

3.5.8

plug-top (direct plug-in) power supply

power supply built into a mains voltage plug top

3.5.9

uninterruptible power supply

UPS

intended to provide a source of energy secure against mains failure. This type of product would normally be free-standing

3.6

end-product

finished unit which is designed to stand alone, useable by an end-user and having a direct function for the end-user. It is intended to be placed on the market and/or taken into service as a single unit or as part of a system or installation

3.7

system

localized group of interconnected products which is easily relocatable. Typical examples of this would be a computer, including mouse, keyboard, printer and monitor, or a hi-fi system, TV and video recorder

3.8

installation

collection of interconnected products which is not easily relocatable. Typical examples of this include an industrial process installation or a power plant control installation

3.9

non-professional

person or organization assumed to have little or no technical knowledge or facilities

3.10

professional installer

technically competent person or organization capable of correctly assembling/installing components and subassemblies into an end-product, or end-products into a system or installation, and, in so doing, fully complying with the technical and legal requirements of the end-product, system or installation

3.11

full rated load

maximum continuous or average power a product is marked to supply

3.12

mains supply

3.12.1

industrial mains supply

source of electrical energy provided solely for industrial use

3.12.2

private mains supply

localized source of electrical energy (e.g. generator or UPS) which is not directly connected to the public network

3.12.3

public mains supply

source of electrical energy provided for general public use in domestic, commercial or light industrial environments

3.13

critical frequency of a PSU

the frequency, the wavelength of which is equal to four times the longest side length of the PSU

3.14

residual voltage (of voltage dip)

the minimum value of r.m.s voltage recorded during a voltage dip or short interruption

NOTE The residual voltage may be expressed as a value in volts, or as a percentage or per unit value relative to the reference voltage

4 Applicability of tests to different PSU technologies

Guidance on this issue is given in Annex A.

5 General requirements and test conditions

5.1 General requirements

The manufacturer of the PSU has a responsibility to provide information relating to the EMC performance, application, intended environment and installation guidelines for the product.

5.2 Test conditions

The tests shall be performed using the manufacturer's recommended wiring and installation instructions. There will be no connections other than those specified by the manufacturer.

The configuration, orientation and electrical test conditions of the PSU shall be representative of the worst case in-service conditions, if known. Otherwise, all measurements shall be performed at rated nominal input voltage, full rated load and ambient temperature between 15 °C and 35 °C. The PSU shall be at its normal operating temperature.

The load is presumed not to generate any electromagnetic interference. Load resistors may be cooled by a fan or cooling fluid.

All tests specified in this standard are type tests only.

The equipment shall meet the requirements when measured by the test methods specified.

No additional EMC tests are required or necessary beyond those stated in this standard.

Precautions shall be taken against the EUT (equipment under test) becoming dangerous or unsafe as a result of the immunity tests specified in this standard.

6 Emission requirements

If the cable arrangements of the application are known, then those shall be used. If they are not known, the arrangements shall be chosen in accordance with 6.2 and 6.3. The measuring conditions shall be stated in the documentation.