IEC 62040-2

Edition 3.0 2016-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Uninterruptible power systems (UPS) –
Part 2: Electromagnetic compatibility (EMC) requirements

Alimentations sans interruption (ASI) –
Partie 2: Exigences pour la compatibilité électromagnétique (CEM)

IEC 62040-2:2016-11(en-fr)

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IEC 62040-2
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UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 2: Electromagnetic compatibility (EMC) requirements

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment.

The text of this interpretation sheet is based on the following documents:

FDIS	Report on voting
22H/232/FDIS	22H/236/RVD

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

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Interpretation of 5.3.2.4, Limits at the network ports

Introduction

Sub-clause 5.3.2.4 states that the **network port** limits applicable to **UPS** of **category C1, C2** and **C3** are located in Table 1, Table 2 and Annex C.

It was not clear whether 5.3.2.4 applies to **network ports** that originate and terminate within the **enclosure port** of the **UPS** (i.e. to **network ports** connected exclusively to circuits or devices forming an integral part of the **UPS**).

Interpretation

The **network port** limits in Table 1, Table 2 and Annex C apply only to **network ports** for which connection to circuits or devices external to the **enclosure port** of the **UPS** is allowed. This includes, without limitation, connection to PSTN, ISDN, xDSL and Ethernet networks. The limits in Table 1, Table 2 and Annex C do not apply to **network ports** that originate and terminate within the **enclosure port** of the **UPS** (i.e. to **network ports** connected exclusively to circuits or devices forming an integral part of the **UPS**).

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 2: Electromagnetic compatibility (EMC) requirements

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International Standard IEC 62040-2 has been prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment.

This third edition cancels and replaces the second edition published in 2005. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the inclusion of **network port** limits in Table 1, Table 2 and Annex C for the sake of consistency with other standards;
b) a change of quasi-peak limit for **category C3 UPS** in Table 2 for the sake of consistency with other standards;
c) a clarification in Table 4 about the performance criteria for immunity tests;
d) a revision of some test configurations in Annex A.

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

FDIS	Report on voting
22H/210/FDIS	22H/212/RVD

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

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

In this document, the following print types are used:

– requirements proper and normative annexes: in roman type;
– compliance statements and test specifications: *in italic type*;
– notes and other informative matter: in smaller roman type;
– normative conditions within tables: in smaller roman type;
– terms that are defined in Clause 3: **bold**.

A list of all parts in the IEC 62040 series, published under the general title *Uninterruptible power systems (UPS)*, can be found on the IEC website.

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

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

The contents of the Interpretation sheet of June 2018 have been included in this copy.

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UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 2: Electromagnetic compatibility (EMC) requirements

1 Scope

This part of IEC 62040 is a type test product standard for electromagnetic compatibility (EMC) and applies to movable, stationary, fixed or built-in, pluggable and permanently connected UPS for use in low-voltage distribution systems with an environment being either residential, commercial, light industrial or industrial, which deliver output voltage with **port** voltages not exceeding 1 500 V DC or 1 000 V AC and which include an energy storage device.

Subject to installing, operating and maintaining the UPS in the manner prescribed by the manufacturer, this standard defines emission limits, immunity levels, test methods and performance criteria for a complete UPS to comply with the essential EMC requirements necessary to avoid the UPS interfering with other apparatus, e.g. radio receivers, and to avoid the UPS being affected by external phenomena.

This standard does not address EMC phenomena produced by loads connected to the UPS or situations created by any apparatus external to the UPS other than as described in the immunity requirements.

This standard is harmonized with applicable IEC standards for electromagnetic emission limits and immunity levels. It contains additional requirements applicable to UPS.

This standard does not cover:

a) low-voltage DC power supply devices covered by IEC 61204 standards;

b) systems wherein the output voltage is derived from a rotating machine.

NOTE 1 UPS generally connect to their energy storage device through a DC link. A chemical battery is an example of an energy storage device. Alternative devices can be suitable, and as such, where “battery” appears in the text of this standard, this can be understood as “energy storage device”.

NOTE 2 This type test-based product standard allows EMC conformity assessment of UPS included in one of categories C1, C2 and C3 before placing them on the market. It also provides guidance for conformity assessment of UPS included in category C4 (see Clause 4).

NOTE 3 The differing test conditions necessary to encompass the range of physical sizes and power ratings of a complete UPS are taken into account. A complete UPS can consist of one or more interconnected units. For UPS configuration details refer to IEC 62040-3:2011, Annex A.

NOTE 4 The requirements have been selected so as to permit an adequate level of EMC for UPS installed in residential, commercial, light industrial and industrial locations. The requirements are not always sufficient to cover situations with low probability of occurrence including UPS faults.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61000-2-2:2002, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61000-3-2:2014, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-12:2011, *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 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances induced by radio-frequency fields*

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

IEC 62040-3:2011, *Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 16-1-1:2015, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-1-2:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements*

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*
CISPR 16-1-4:2010/AMD1:2012

CISPR 16-2-1:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR 16-2-3:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*
CISPR 16-2-3:2010/AMD1:2010
CISPR 16-2-3:2010/AMD2:2014

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms, definitions and abbreviated terms

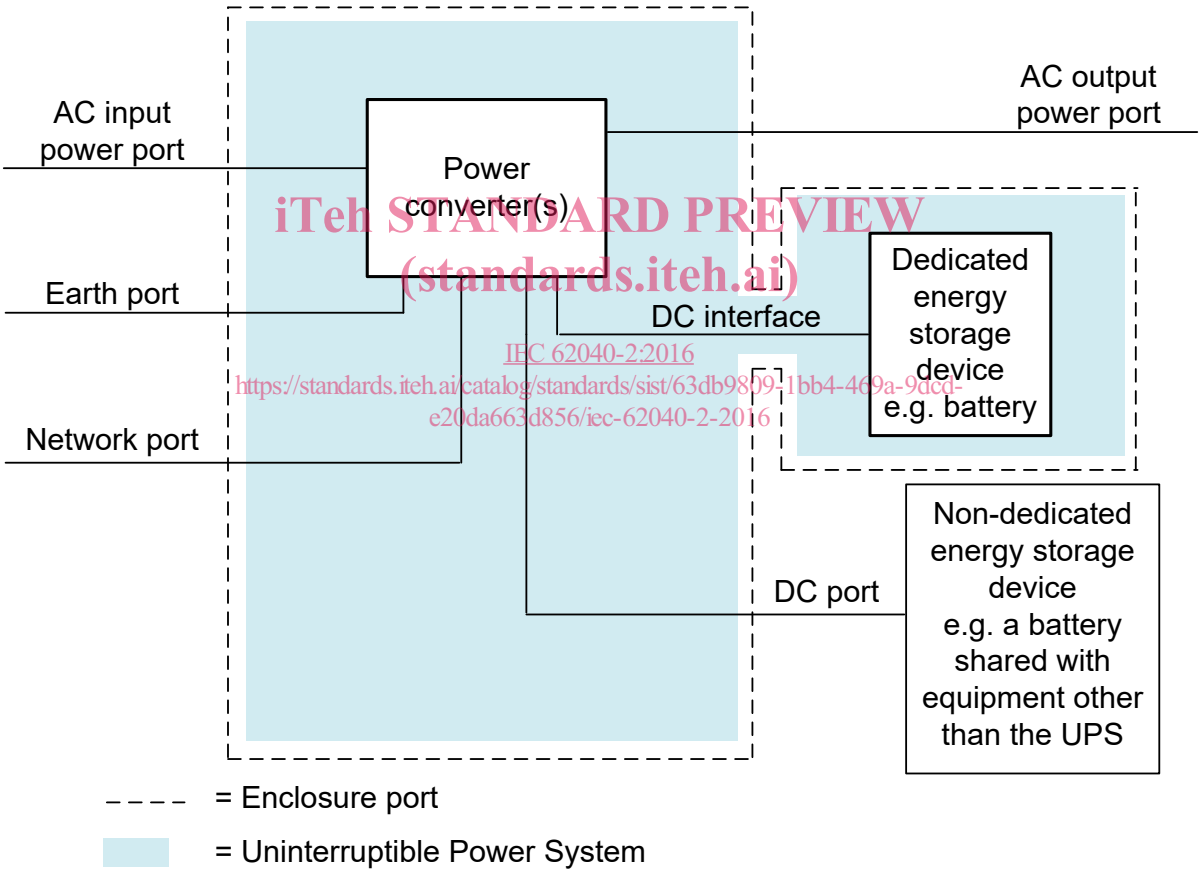
3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62040-3:2011 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
port
particular interface of the UPS with the external electromagnetic environment as shown in Figure 1



IEC

Figure 1 – UPS ports

3.1.2
DC interface
dedicated connection between the power converter and an energy storage device that is exclusively used by the UPS

Note 1 to entry: The interface to an energy storage device intended for exclusive use of the UPS is not a **port** because this device is included in the UPS. The dedicated energy storage device shown in Figure 1 is connected through a **DC interface**.

3.1.3
DC port
connection from the power converter to an energy storage device that is not exclusively used by the UPS

Note 1 to entry: The non-dedicated energy storage device is connected through a **DC port**.

3.1.4
enclosure port
physical boundary of the equipment under test (EUT) which electromagnetic fields can radiate through or impinge on

Note 1 to entry: In Figure 1, the **enclosure port** represented by the dotted line around the power converter(s) and the dedicated energy storage device does not imply the existence of any shielding.

3.1.5
network port
signal, control or communication **ports** intended for the interconnection of components of an uninterruptible power system (UPS), or between a UPS and local associated equipment and used in accordance with relevant functional specifications for the purpose of control and/or monitoring of the UPS system and/or control of the associated equipment in accordance with the instruction manual

Note 1 to entry: The maximum length of cable connected to the **network port** is an example of relevant functional specifications.

3.1.6
first environment
environment that includes residential, commercial and light industrial premises directly connected, without intermediate transformers, to a public low-voltage mains supply

3.1.7
second environment
environment that includes all commercial, light industry and industrial locations other than those included in the **first environment**

Note 1 to entry: A building, or part of it, when supplied from a dedicated transformer or generator is an example of **second environment**.

3.1.8
category C1 UPS
UPS intended for use without any restriction in the **first environment**

Note 1 to entry: Such UPS are suitable for use in residential locations.

3.1.9
category C2 UPS
UPS intended for use without any restriction in the **second environment**

Note 1 to entry: Such UPS can also be used in the **first environment** under certain conditions.

3.1.10
category C3 UPS
UPS with an output current exceeding 16 A and intended for use in the **second environment** with certain restrictions

3.1.11
category C4 UPS
UPS that cannot be classified within any of the C1, C2 or C3 categories and intended for use in environments subject to particular requirements

3.2 Abbreviated terms

AAN asymmetric artificial network

NOTE 1 The terms impedance stabilization network (ISN) and AAN are used interchangeably.

AE auxiliary equipment

AMN artificial mains network

NOTE 2 The terms line impedance stabilization network (LISN) and AMN are used interchangeably.

CMAD common mode absorption device

EUT equipment under test

RF radio frequency

4 UPS categories

4.1 Category C1 UPS

This category includes UPS intended for use without any restriction in the **first environment**.

Category C1 UPS shall comply with category C1 requirements for emission limits (see Clause 5) and for immunity (see Clause 6).

4.2 Category C2 UPS

This category includes UPS intended for use without any restriction in the **second environment**. Such UPS may also be used in the **first environment** when the effect of the warning notice below is considered.

Category C2 UPS shall comply with category C2 requirements for emission limits (see Clause 5) and for immunity (see Clause 6).

The following warning shall be included in the user manual.

WARNING: This is a **category C2 UPS** product. In a residential environment, this product may cause radio interference, in which case the user may be required to take additional measures.

NOTE Such additional measures can require the services of a person or organization skilled with respect to EMC aspects.

4.3 Category C3 UPS

This category includes UPS with an output current exceeding 16 A and intended for use in the **second environment** with the following restrictions:

a) the UPS shall be installed and commissioned by a professional person or organization that is skilled with respect to EMC aspects;

b) the UPS location shall be physically separated from other buildings classified as **first environment** by a distance greater than 30 m or by a structure which acts as a barrier to radiated phenomena providing equivalent attenuation; and

c) the installation shall be supplied through a dedicated transformer or generator or through a device providing equivalent attenuation.

Category C3 UPS shall comply with category C3 requirements for emission limits (see Clause 5) and for immunity (see Clause 6).

The following warning shall be included in the user manual.