

**SLOVENSKI STANDARD
SIST EN IEC 62040-2:2018****01-december-2018****Nadomešča:
SIST EN 62040-2:2006**

Sistemi z neprekinjenim napajanjem - 2. del: Zahteve za elektromagnetno združljivost (EMC) (IEC 62040-2:2016)

Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (IEC 62040-2:2016)

Unterbrechungsfreie Stromversorgungssysteme (USV) - Teil 2: Anforderungen an die elektromagnetische Verträglichkeit (EMV) (IEC 62040-2:2016)

Alimentations sans interruption (ASI) - Partie 2 : exigences pour la compatibilité électromagnétique (CEM) (IEC 62040-2:2016)

Ta slovenski standard je istoveten z: EN IEC 62040-2:2018**ICS:**

29.200	Usmerniki. Pretvorniki. Stabilizirano električno napajanje	Rectifiers. Convertors. Stabilized power supply
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

SIST EN IEC 62040-2:2018**en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 62040-2:2018

<https://standards.iteh.ai/catalog/standards/sist/349f958e-40c9-49f4-8801-1a89137eefd/sist-en-iec-62040-2-2018>

EUROPEAN STANDARD

EN IEC 62040-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2018

ICS 33.100.10; 17.220; 29.200

Supersedes EN 62040-2:2006

English Version

Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements (IEC 62040-2:2016)

Alimentations sans interruption (ASI) - Partie 2: Exigences
pour la compatibilité électromagnétique (CEM)
(IEC 62040-2:2016)

Unterbrechungsfreie Stromversorgungssysteme (USV) -
Teil 2: Anforderungen an die elektromagnetische
Verträglichkeit (EMV)
(IEC 62040-2:2016)

This European Standard was approved by CENELEC on 2018-07-09. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

SIST EN IEC 62040-2:2018

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 62040-2:2018 (E)**European foreword**

The text of document 22H/232/FDIS, future edition 3 of IEC 62040-2, prepared by SC 22H "Uninterruptible power systems (UPS)" of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62040-2:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-04-09
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-07-09

This document supersedes EN 62040-2:2006.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

(standards.iteh.ai)

Endorsement notice

<https://standards.iteh.ai/catalog/standards/sist/349f958e-40c9-49f4-8801-1a89137eefdd/sist-en-iec-62040-2-2018>

The text of the International Standard IEC 62040-2:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61000-4 series	NOTE	Harmonized as EN 61000-4 series.
IEC 61204 series	NOTE	Harmonized as EN 61204 series.
CISPR 15:2013	NOTE	Harmonized as EN 55015:2013 (not modified).
CISPR 15:2013/A1:2015	NOTE	Harmonized as EN 55015:2013/A1:2015 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
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	EN 61000-2-2	2002
IEC 61000-3-2	2014	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)	EN 61000-3-2	2014
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	EN 61000-3-12	2011
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2006	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3	2006
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
IEC 61000-4-6	2013	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2014

EN IEC 62040-2:2018 (E)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-8	2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8	2010
IEC 62040-3	2011	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements	EN 62040-3	2011
CISPR 11 (mod)	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016
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	EN 55016-1-2	2014
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	EN 55016-1-4	2010
+A1	2012		+A1	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	EN 55016-2-1	2014
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	EN 55016-2-3 +AC	2010 2013
+A1	2010		+A1	2010
+A2	2014		+A2	2014
CISPR 22 (mod)	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022 +AC	2010 2011



IEC 62040-2

Edition 3.0 2016-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220; 29.200; 33.100.10

ISBN 978-2-8322-3753-3

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 62040-2
Edition 3.0 2016-11

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

SIST EN IEC 62040-2:2018

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.

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**).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 62040-2:2018

<https://standards.iteh.ai/catalog/standards/sist/349f958e-40c9-49f4-8801-1a89137eefd/sist-en-iec-62040-2-2018>

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms.....	11
4 UPS categories	11
4.1 Category C1 UPS.....	11
4.2 Category C2 UPS.....	11
4.3 Category C3 UPS.....	11
4.4 Category C4 UPS.....	12
4.5 Categories and environment	12
4.6 Documentation.....	12
5 Emission.....	12
5.1 General.....	12
5.2 General test requirements.....	13
5.3 Measurement requirements.....	13
5.3.1 General.....	13
5.3.2 Conducted emission.....	13
5.3.3 Radiated emission	15
6 Immunity.....	16
6.1 General.....	16
6.2 General requirements and performance criteria.....	16
6.3 Basic immunity requirements	17
6.3.1 General	17
6.3.2 Category C1 UPS	17
6.3.3 Category C2 and C3 UPS	18
6.4 Immunity to voltage dips, short interruptions and voltage variations	19
Annex A (normative) Electromagnetic emission – Test methods.....	20
A.1 General.....	20
A.2 Measuring equipment.....	20
A.2.1 Measuring instruments.....	20
A.2.2 Artificial mains network (AMN).....	20
A.2.3 Voltage probe	20
A.2.4 Antennas	21
A.2.5 Common mode absorption device (CMAD).....	21
A.2.6 Asymmetric artificial network	21
A.3 Test unit configuration	21
A.4 Determination of maximum emission configurations	22
A.5 Operation of the equipment under test	22
A.6 Method of measurement of mains terminal disturbance voltage.....	23
A.6.1 Measuring receivers	23
A.6.2 Artificial mains network (AMN).....	23
A.6.3 Ground plane.....	24
A.6.4 Equipment set-up for conducted emission measurements.....	24
A.6.5 Conducted emission measurement	24

A.7	Method of measurement at AC output ports (where applicable)	25
A.8	Method of measurement of radiated emission	25
A.8.1	General	25
A.8.2	Measuring receivers	25
A.8.3	Antennas	26
A.9	Measurement site	26
A.9.1	Test site	26
A.9.2	Alternative test sites	26
A.10	Equipment set-up for radiated emission tests	26
A.10.1	General	26
A.10.2	Radiated emission measurement	27
A.10.3	Measurement in the presence of high ambient signals	27
A.11	Measurement of radiated magnetic disturbances	27
A.12	Measurement of network port disturbances	27
Annex B (informative)	Electromagnetic emission limits and measurement methods of magnetic field – H field	38
Annex C (normative)	Electromagnetic emission – Limits of network ports	40
Annex D (normative)	Electromagnetic immunity – Test methods	41
D.1	General	41
D.1.1	Object	41
D.1.2	Test environment	41
D.2	Electrostatic discharge (ESD)	41
D.3	Immunity to radiated electromagnetic (EM) fields	41
D.3.1	General	41
D.3.2	Arrangement of wiring	41
D.4	Immunity to fast transients	41
D.5	Immunity to surges	42
D.6	Immunity to low-frequency signals	42
D.6.1	Power line harmonics and inter-harmonics	42
D.6.2	Power line unbalance (three-phase UPS systems only)	42
Annex E (informative)	User installation testing	44
Bibliography	45
Figure 1	– UPS ports	9
Figure A.1	– Circuit for disturbance voltage measurements on mains supply or UPS output	28
Figure A.2	– Minimum alternative test site	28
Figure A.3	– Set-up for measurement of conducted emission for table-top units using voltage probe	29
Figure A.4	– Set-up for measurement of conducted emission for table-top units using AMN (alternative method)	30
Figure A.5	– Test set-up for floor-standing units	30
Figure A.6	– Test set-up for floor-standing units using AMN (alternative method)	31
Figure A.7	– Test configuration for table-top equipment (conducted emission measurement)	32
Figure A.8	– Test configuration for table-top equipment (conducted emission measurement) – Plan view	33

Figure A.9 – Alternative test configuration for table-top equipment (conducted emission measurement) – Plan view	33
Figure A.10 – Test configuration for floor-standing equipment (conducted emission measurement).....	34
Figure A.11 – Test configuration for table-top equipment (radiated emission requirement)	35
Figure A.12 – Test configuration for floor-standing equipment (radiated emission measurement).....	36
Figure A.13 – Test configuration for top entry floor-standing equipment (radiated emission measurement)	37
Figure B.1 – Test set-up for measuring radiated disturbances	38
Figure D.1 – Amplitude unbalance	43
Figure D.2 – Phase unbalance	43
Table 1 – Limits of mains terminal and network port disturbance voltage for category C1 and category C2 UPS in the frequency range 0,15 MHz to 30 MHz.....	14
Table 2 – Limits of mains terminal and network port disturbance voltage for category C3 UPS in the frequency range 0,15 MHz to 30 MHz	14
Table 3 – Limits of radiated emission in the frequency range 30 MHz to 1 000 MHz.....	15
Table 4 – Performance criteria for immunity tests	16
Table 5 – Minimum immunity requirements for category C1 UPS	17
Table 6 – Minimum immunity requirements for category C2 and C3 UPS	18
Table B.1 – UPS which has a rated output current less than or equal to 16 A	38
Table B.2 – UPS which has a rated output current greater than 16 A	39
Table C.1 – Limits of network ports for category C1 UPS	40
Table C.2 – Limits of network ports for category C2 UPS	40
Table C.3 – Limits of network ports for category C3 UPS	40

INTERNATIONAL ELECTROTECHNICAL COMMISSION

UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 2: Electromagnetic compatibility (EMC) requirements

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 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, [SIST EN IEC 62040-2:2018](https://standards.iteh.ai/catalog/standards/sist/349f958e-40c9-49f4-8801-1a89137eefdd/sist-en-iec-62040-2-2018)
- replaced by a revised edition, or <https://standards.iteh.ai/catalog/standards/sist/349f958e-40c9-49f4-8801-1a89137eefdd/sist-en-iec-62040-2-2018>
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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*