SVENSK STANDARD SS-EN IEC 62040-3

Fastställd	Utgåva	Sida	Ansvarig kommitté
2022-04-20	3	1 (1+97)	SEK TK 22

Utrustning för avbrottsfri elförsörjning, UPS – Del 3: Egenskaper och provning

Uninterruptible power systems (UPS) –
Part 3: Method of specifying the performance and test requirements

Som svensk standard gäller europastandarden EN IEC 62040-3:2021. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 62040-3:2021.

Nationellt förord

Europastandarden EN IEC 62040-3:2021

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 62040-3, Third edition, 2021 - Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 62040-3, utgåva 2, 2012, gäller ej fr o m 2024-05-26

ICS 29.200.00

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62040-3

May 2021

ICS 29.200

Supersedes EN 62040-3:2011 and all of its amendments and corrigenda (if any)

English Version

Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements (IEC 62040-3:2021)

Alimentations sans interruption (ASI) - Partie 3: Méthode de spécification des performances et exigences d'essai (IEC 62040-3:2021)

Unterbrechungsfreie Stromversorgungssysteme (USV) - Teil 3: Methoden zum Festlegen der Leistungs- und Prüfungsanforderungen (IEC 62040-3:2021)

This European Standard was approved by CENELEC on 2021-05-26. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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

Ref. No. EN IEC 62040-3:2021 E

European foreword

The text of document 22H/267/FDIS, future edition 3 of IEC 62040-3, 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 62040-3:2021.

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) 2022-02-26
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-05-26

This document supersedes EN 62040-3:2011 and all of its amendments and corrigenda (if any).

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.

Endorsement notice

The text of the International Standard IEC 62040-3:2021 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 60034-22	NOTE	Harmonized as EN 60034-22
IEC 60068-1:2013	NOTE	Harmonized as EN 60068-1:2014 (not modified)
IEC 60068-2 (series)	NOTE	Harmonized as EN IEC 60068-2 (series)
IEC 60068-3-3:2019	NOTE	Harmonized as EN IEC 60068-3-3:2019 (not modified)
IEC 60196	NOTE	Harmonized as EN 60196
IEC 60896-21:2004	NOTE	Harmonized as EN 60896-21:2004 (not modified)
IEC 60898-1:2015	NOTE	Harmonized as EN 60898-1:2019 (modified)
IEC 60947-3	NOTE	Harmonized as EN IEC 60947-3
IEC 60947-6-1	NOTE	Harmonized as EN 60947-6-1
IEC 61000-2-4:2002	NOTE	Harmonized as EN 61000-2-4:2002 (not modified)
IEC 61000-4-30	NOTE	Harmonized as EN 61000-4-30
IEC 61508 (series)	NOTE	Harmonized as EN 61508 (series)
IEC 62040-4	NOTE	Harmonized as EN 62040-4
IEC 62040-5-3	NOTE	Harmonized as EN 62040-5-3
IEC 62310-3	NOTE	Harmonized as EN 62310-3
IEC 62485-2:2010	NOTE	Harmonized as EN IEC 62485-2:2018 (not modified)
IEC 88528-11:2004	NOTE	Harmonized as EN 88528-11:2004 (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 60038 (mod)	2009	IEC standard voltages	EN 60038	2011
IEC 60068-2-1	2007	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	2007
IEC 60068-2-2	2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	2007
IEC 60068-2-27	2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	EN 60068-2-27	2009
IEC 60068-2-78	2012	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2013
IEC 60146-1-1	2009	Semiconductor converters - General requirements and line commutated converters - Part 1-1: Specification of basic requirements	EN 60146-1-1	2010
IEC 60146-2	1999	Semiconductor converters - Part 2: Self-commutated semiconductor converters including direct d.c. converters	EN 60146-2	2000
IEC 60364-1	-	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions	HD 60364-1	-
IEC 60364-5-52	-	Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems	HD 60364-5-52	-
IEC 60664-1	2020	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
IEC/TR 60721-4-3	2001	Classification of environmental conditions - Part 4-3: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 - Stationary use at weatherprotected locations	-	-

Publication	Year	Title	EN/HD	Year
+ A1	2003		-	-
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
+ A1	2017		+ A1	2017
+ A2	2018		+ A2	2019
IEC 61000-3-2	2018	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)	EN IEC 61000-3-2	2019
IEC/TS 61000-3-4	1998	Electromagnetic compatibility (EMC) - Part 3-4: Limits - Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A	-	-
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 62040-1	2017	Uninterruptible power systems (UPS) - Part 1: Safety requirements	EN IEC 62040-1	2019
-	-		+ A11	2021
IEC 62040-2	2016	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN IEC 62040-2	2018
ISO 3744	2010	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane	EN ISO 3744	2010
ISO 3746	2010	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane	EN ISO 3746	2010
ISO 4180	2019	Packaging - Complete, filled transport packages - General rules for the compilation of performance test schedules	EN ISO 4180	2019

IEC 62040-3

Edition 3.0 2021-04

INTERNATIONAL STANDARD

colour inside

Uninterruptible power systems (UPS) –
Part 3: Method of specifying the performance and test requirements

INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 3: Method of specifying the performance and test 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.
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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.

IEC 62040-3 was prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment. It is an International Standard.

This third edition cancels and replaces the second edition published in 2011 and constitutes a technical revision.

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

a) environmental conditions aligned with IEC 62040-1:2017 (UPS safety requirements);
b) compliance requirements included in all sub-clauses referenced in Table 5 UPS test schedule;
c) non-linear step load is no longer a type test and was removed from 6.4 in consistency with requirements for switch mode power supplies incorporating inrush current controls; this resulted in the performance classification coding being shortened from 8 to 7 characters (see 5.3.4);
d) free-fall test aligned with ISO 4180 (see 6.5.1.3);

e) multiple normal mode UPS test requirements introduced;

f) non-linear load requirements relaxed in Annex E in consistency with requirements for switch mode power supplies complying with the applicable limits for harmonic current in IEC 61000-3-2 and IEC 61000-3-12;

g) minimum UPS efficiency values referenced in Annex I became normative and are based on active output power rating and utilisation of weighting factors rather than on allowances related to isolation transformers, input harmonic current filters and input voltages.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
22H/267/FDIS	22H/270/RVD

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

The language used for the development of this International Standard is English.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 of 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.

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 3: Method of specifying the performance and test requirements

1 Scope

This part of IEC 62040 establishes the performance and test requirements applied to **movable**, **stationary** and **fixed** electronic **uninterruptible power systems (UPS)** that

- are supplied from AC voltage not exceeding 1 000 V,
- deliver AC **output voltage** not exceeding 1 000 V,
- incorporate an **energy storage device** not exceeding 1 500 V DC, and
- have a primary function to ensure **continuity of load power**.

This document specifies performance and test requirements of a complete **UPS** and, where applicable, of individual **UPS functional units**. Requirements for the individual **UPS functional units** found in IEC publications listed in the Bibliography apply so far that they are not in contradiction with this document.

UPS are developed for a wide range of power, from less than hundred watts to several megawatts, to meet requirements for availability and quality of power to a variety of **loads**. Refer to Annex A and Annex B for information on typical **UPS** configurations and topologies.

This document also includes **UPS** performance and test requirements related to **UPS switches** that interact with **UPS functional units** to maintain **continuity of load power**.

This document does not cover

- conventional AC and DC distribution boards and their associated switches,
- stand-alone static transfer systems covered by IEC 62310-3,
- rotary UPS covered by IEC 88528-11, and
- DC UPS covered by IEC 62040-5-3.

NOTE 1 This document recognises that **continuity of load power** to information technology (IT) equipment represents a major **UPS** application. The **UPS** output characteristics specified in this document are therefore also aimed at ensuring compatibility with the requirements of IT equipment. This, subject any limitation stated in the manufacturer's declaration, includes requirements for **steady state** and **transient** voltage variation as well as for the supply of both **linear** and **non-linear load** characteristics of IT equipment.

NOTE 2 Test **loads** specified in this document simulate both **linear** and **non-linear load** characteristics. Their use permits verification of the performance declared by the manufacturer while minimising complexity and energy consumption during the tests.

NOTE 3 This document is aimed at 50 Hz and 60 Hz applications but does not exclude other frequency applications within the domain of IEC 60196. This is subject to an agreement between manufacturer and purchaser with respect to any particular requirements arising.

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 cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038:2009, *IEC standard voltages*

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60146-1-1:2009, *Semiconductor converters – General requirements and line commutated converters – Part 1-1: Specification of basic requirements*

IEC 60146-2:1999, *Semiconductor converters – Part 2: Self-commutated semiconductor converters including direct d.c. converters*

IEC 60364-1, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-5-52, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC TR 60721-4-3:2001, *Classification of environmental conditions – Part 4-3: Guidance for the correlation and transformation of environmental condition classes of IEC 60721-3 to the environmental tests of IEC 60068 – Stationary use at weatherprotected locations*
IEC TR 60721-4-3/AMD1:2003

IEC 61000-2-2:2002, *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems*
IEC 61000-2-2:2002/AMD1:2017
IEC 61000-2-2:2002/AMD2:2018

IEC 61000-3-2:2018, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC TS 61000-3-4:1998, *Electromagnetic compatibility (EMC) – Part 3-4: Limits – Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A*

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 62040-1:2017, *Uninterruptible power systems (UPS) – Part 1: Safety requirements*

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

ISO 3744:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 3746:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*

ISO 4180:2019, *Packaging – Complete, filled transport packages – General rules for the compilation of performance test schedules*