

**KATKEMATU TOITE SÜSTEEMID.  
OSA 1: OHUTUSNÕUDED**

**Uninterruptible power systems (UPS) - Part 1: Safety requirements (IEC 62040-1:2017 + IEC 62040-1:2017/A1:2021 + IEC 62040-1:2017/AMD2:2022)**

**EESTI STANDARDI EESSÕNA****NATIONAL FOREWORD**

<p>See Eesti standard EVS-EN IEC 62040-1:2019+A11+A1+A2:2025 sisaldab Euroopa standardi EN IEC 62040-1:2019 ja selle muudatuste A11:2021, A1:2023 ja A2:2025 ning paranduse AC:2019 ingliskeelset teksti.</p>	<p>This Estonian standard EVS-EN IEC 62040-1:2019+A11+A1+A2:2025 consists of the English text of the European standard EN IEC 62040-1:2019 and its amendments A11:2021, A1:2023 and A2:2025; and its corrigendum AC:2019.</p>
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<p>Muudatusega A11 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>A11</b> <b>A11</b>.</p> <p>Parandusega AC lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>AC</b> <b>AC</b>.</p> <p>Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>A1</b> <b>A1</b>.</p> <p>Muudatusega A2 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega <b>A2</b> <b>A2</b>.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>The start and finish of text introduced or altered by amendment A11 is indicated in the text by tags <b>A11</b> <b>A11</b>.</p> <p>The start and finish of text introduced or altered by corrigendum AC is indicated in the text by tags <b>AC</b> <b>AC</b>.</p> <p>The start and finish of text introduced or altered by amendment A1 is indicated in the text by tags <b>A1</b> <b>A1</b>.</p> <p>The start and finish of text introduced or altered by amendment A2 is indicated in the text by tags <b>A2</b> <b>A2</b>.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN IEC 62040-1 + A11 + A1  
+ A2**

July 2019, February 2021, October 2023,  
March 2025

ICS 29.200

Supersedes EN 62040-1:2008 and all of its amendments  
and corrigenda (if any)

English Version

**Uninterruptible power systems (UPS) - Part 1: Safety  
requirements  
(IEC 62040-1:2017 + IEC 62040-1:2017/A1:2021 + IEC 62040-  
1:2017/AMD2:2022)**

Alimentations sans interruption (ASI) - Partie 1: Exigences  
de sécurité  
(IEC 62040-1:2017 + IEC 62040-1:2017/A1:2021 + IEC  
62040-1:2017/AMD2:2022)

Unterbrechungsfreie Stromversorgungssysteme (USV) -  
Teil 1: Sicherheitsanforderungen  
(IEC 62040-1:2017 + IEC 62040-1:2017/A1:2021 + IEC  
62040-1:2017/AMD2:2022)

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+ EN IEC 62040-1:2019/A1:2023 + EN IEC 62040-1:2019/A2:2025 E

## European foreword

The text of document 22H/217/FDIS, future edition 2 of IEC 62040-1, 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 62040-1:2019.

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-07-19

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

IEC 60076-11:2004	NOTE	Harmonized as EN 60076-11:2004 (not modified)
IEC 60364-5-52	NOTE	Harmonized as HD 60364-5-52
IEC 60947-1:2007	NOTE	Harmonized as EN 60947-1:2007 (not modified)
IEC 60947-3:2008	NOTE	Harmonized as EN 60947-3:2009 (not modified)
IEC 60947-6-1:2005	NOTE	Harmonized as EN 60947-6-1:2005 (not modified)
IEC 60947-6-1:2005/A1:2013	NOTE	Harmonized as EN 60947-6-1:2005/A1:2014 (not modified)
IEC 61347 (series)	NOTE	Harmonized as EN 61347 (series)
IEC 61439-1:2011	NOTE	Harmonized as EN 61439-1:2011 (not modified)
IEC 61508 (series)	NOTE	Harmonized as EN 61508 (series)
IEC 62040-3:2011	NOTE	Harmonized as EN 62040-3:2011 (not modified)
IEC 62310-1	NOTE	Harmonized as EN 62310-1
IEC 62368-1:2014	NOTE	Harmonized as EN 62368-1:2014/AC:2015 (not modified)

**A11 Amendment A11 European foreword**

This document (EN IEC 62040-1:2019/A11:2021) has been prepared by CLC/TC 22X "Power electronics".

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document. A11

## **A1** Amendment A1 European foreword

The text of document 22H/269/FDIS, future IEC 62040-1/A1, 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 62040-1:2019/A1:2023.

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## **A<sub>2</sub>** Amendment A2 European foreword

The text of document 22H/288/CDV, future edition 2 of IEC 62040-1/AMD2, 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 62040-1:2019/A2:2025.

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# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Uninterruptible power systems (UPS) –  
Part 1: Safety requirements**

**Alimentations sans interruption (ASI) –  
Partie 1: Exigences de sécurité**



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IEC 62040-1

Edition 2.2 2022-11  
CONSOLIDATED VERSION

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Uninterruptible power systems (UPS) –  
Part 1: Safety requirements**

**Alimentations sans interruption (ASI) –  
Partie 1: Exigences de sécurité**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

#### Part 1: Safety requirements

#### FOREWORD

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International Standard IEC 62040-1 has been prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment.

This second edition cancels and replaces the first edition published in 2008 and its Amendment 1:2013. This edition constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition: the reference document has been changed from IEC 60950-1:2005 (safety for IT equipment) to IEC 62477-1 (group safety standard for power electronic converters).

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

FDIS	Report on voting
22H/217/FDIS	22H/218/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.

This International Standard is to be read in conjunction with IEC 62477-1:2012.

The provisions of the general rules dealt within IEC 62477-1:2012 are only applicable to this document insofar as they are specifically cited. Clauses and subclauses of IEC 62477-1:2012 that are applicable in this document are identified by reference to IEC 62477-1:2012, for example, "Clause 4 of IEC 62477-1:2012 applies, except as follows".

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- compliance statements and test specifications: *italic type*
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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

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Amendment 1 to IEC 62040-1:2017 has been prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment.

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

FDIS	Report on voting
22H/269/FDIS	22H/271/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 Amendment is English.

This document was drafted in accordance with 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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications/](http://www.iec.ch/standardsdev/publications/).

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- amended. A1

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## A2 Amendment A2 FOREWORD

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Amendment 2 to IEC 62040-1:2017 has been prepared by subcommittee 22H: Uninterruptible power systems (UPS), of IEC technical committee 22: Power electronic systems and equipment.

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

Draft	Report on voting
22H/288/CDV	22H/298/RVC

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 Amendment is English.

This document was drafted in accordance with 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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications/](http://www.iec.ch/publications/).

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

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## INTRODUCTION

IEC technical sub-committee 22H: Uninterruptible power systems (UPS) carefully considered the relevance of each paragraph of IEC 62477-1:2012 in UPS applications. This part of IEC 62040 utilizes IEC 62477-1:2012 as a reference document and references, adds, replaces or modifies requirements as relevant. This is because product-specific topics not covered by the reference document are the responsibility of the technical committee using the reference document.

IEC 62477-1:2012 relates to products that include power electronic converters, with a rated system voltage not exceeding 1 000 V AC or 1 500 V DC. It specifies requirements to reduce risks of fire, electric shock, thermal, energy and mechanical hazards, except functional safety as defined in IEC 61508 (all parts). The objectives of this document are to establish a common terminology and basis for the safety requirements of products that contain power electronic converters across several IEC technical committees.

IEC 62477-1:2012 was developed with the intention:

- to be used as a reference document for product committees inside IEC technical committee 22: Power electronic systems and equipment in the development of product standards for power electronic converter systems and equipment;
- to replace IEC 62103 as a product family standard providing minimum requirements for safety aspects of power electronic converter systems and equipment in apparatus for which no product standard exists; and

NOTE The scope of IEC 62103 contains reliability aspects, which are not covered by this document.

- to be used as a reference document for product committees outside TC 22 in the development of product standards of power electronic converter systems and equipment intended for renewable energy sources. TC 82, TC 88, TC 105 and TC 114, in particular, have been identified as relevant technical committees at the time of publication.

The reference document, being a group safety standard, will not take precedence over this product-specific standard according to IEC Guide 104. IEC Guide 104 provides information about the responsibility of product committees to use group safety standards for the development of their own product standards.

# UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

## Part 1: Safety requirements

### 1 Scope

This part of IEC 62040 applies to movable, stationary, fixed or built-in **UPS** for use in low-voltage distribution systems and that are intended to be installed in an area accessible by an **ordinary person** or in a restricted access area as applicable, that deliver fixed frequency AC output voltage with port voltages not exceeding 1 000 V AC or 1 500 V DC and that include an energy storage device. It applies to pluggable and to permanently connected **UPS**, whether consisting of a system of interconnected units or of independent units, subject to installing, operating and maintaining the **UPS** in the manner prescribed by the manufacturer.

NOTE 1 Typical **UPS** configurations, including voltage and/or frequency converters and other topologies, are described in IEC 62040-3, the test and performance product standard for **UPS**.

NOTE 2 **UPS** generally connect to their energy storage device through a DC link. A chemical battery is used throughout the standard as an example of an energy storage device. Alternative devices exist, and as such, where "battery" appears in the text of this document, this is to be understood as "energy storage device".

This document specifies requirements to ensure safety for the **ordinary person** who comes into contact with the **UPS** and, where specifically stated, for the **skilled person**. The objective is to reduce risks of fire, electric shock, thermal, energy and mechanical hazards during use and operation and, where specifically stated, during service and maintenance.

This product standard is harmonized with the applicable parts of group safety publication IEC 62477-1:2012 for power electronic converter systems and contains additional requirements relevant to **UPS**.

This document does not cover:

- UPS that have a DC output;
- systems for operation on moving platforms including, but not limited to, aircrafts, ships and motor vehicles;
- external AC or DC input and output distribution boards covered by their specific product standard;
- stand-alone static transfer systems (STS) covered by IEC 62310-1;
- systems wherein the output voltage is directly derived from a rotating machine;
- telecommunications apparatus other than **UPS** for such apparatus;
- functional safety aspects covered by IEC 61508 (all parts).

NOTE 3 Even if this document does not cover the applications listed above, it is commonly taken as a guide for such applications.

NOTE 4 Specialized **UPS** applications are generally governed by additional requirements covered elsewhere, for example **UPS** for medical applications.

### 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.

Clause 2 of IEC 62477-1:2012 applies, except as follows:

*Add the following normative references:*

IEC 60364-4-42, *Low-voltage electrical installations – Part 4-42: Protection for safety – Protection against thermal effects*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification – Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC TR 60755, *General requirements for residual current operated protective devices*

IEC 60947-2:2006, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*<sup>1</sup>

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

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 61008-1, *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

IEC 61009-1, *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

IEC 62040-2:2005, *Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*<sup>2</sup>

IEC 62477-1:2012, *Safety requirements for power electronic converter systems and equipment – Part 1: General*

### **3 Terms and definitions**

Clause 3 of IEC 62477-1:2012 applies, except as follows:

*Add the following new terms and definitions, and new notes:*

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<sup>1</sup> 4<sup>th</sup> edition (2006). This 4<sup>th</sup> edition has been replaced in 2016 by a 5<sup>th</sup> edition IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*.

<sup>2</sup> 2<sup>nd</sup> edition (2005). This 2<sup>nd</sup> edition has been replaced in 2016 by a 3<sup>rd</sup> edition IEC 62040-2:2016, *Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*.