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# Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

| | |
|---|---|
| Käesolev Eesti standard EVS-EN 62040-1:2009 sisaldab Euroopa standardi EN 62040-1:2008 ingliskeelset teksti. | This Estonian standard EVS-EN 62040-1:2009 consists of the English text of the European standard EN 62040-1:2008. |
| Standard on kinnitatud Eesti Standardikeskuse 19.01.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas. | This standard is ratified with the order of Estonian Centre for Standardisation dated 19.01.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation. |
| Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 27.11.2008. | Date of Availability of the European standard text 27.11.2008. |
| Standard on kättesaadav Eesti standardiorganisatsioonist. | The standard is available from Estonian standardisation organisation. |

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**ICS** 29.200

**Võtmesõnad:** electrically-, electrically-opera, electronic engineering, electronic equ, electronic equipment and components, general conditions, power electronics, safety regulations, specification (approval), specifications, uninterruptable, uninterruptible power systems

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 62040-1

November 2008

ICS 29.200

Supersedes EN 62040-1-1:2003 and EN 62040-1-2:2003

English version

## Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS

(IEC 62040-1:2008 + corrigendum August 2008)

Alimentations sans interruption (ASI) - Partie 1: Exigences générales et règles de sécurité pour les ASI (CEI 62040-1:2008 + corrigendum août 2008)

Unterbrechungsfreie Stromversorgungssysteme (USV) - Teil 1: Allgemeine Anforderungen und Sicherheitsanforderungen (IEC 62040-1:2008 + Corrigendum August 2008)

This European Standard was approved by CENELEC on 2008-09-01. 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 Central Secretariat or to any CENELEC member.

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CENELEC

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

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Ref. No. EN 62040-1:2008 E

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## Foreword

The text of document 22H/104/FDIS, future edition 1 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 was approved by CENELEC as EN 62040-1 on 2008-09-01.

This European Standard supersedes EN 62040-1-1:2003 + corrigendum August 2004 and EN 62040-1-2:2003 + corrigendum August 2004.

EN 62040-1:2008 merges all requirements of EN 62040-1-1:2003 and EN 62040-1-2:2003, with the addition of the following:

– update of normative references including EN 60950-1 as Reference Document (RD);

– harmonization and alignment with current world recognized best practices;

– enhancement of backfeed protection, definition of ground-fault, revision of temperature rise tables and of hydrogen concentration in battery compartments.

This standard is to be used in conjunction with EN 60950-1:2006 which is referred to in this standard as "RD".

The following dates were fixed:

| | | |
|---|---|---|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2009-06-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2011-09-01 |

In this standard, 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**.

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 62040-1:2008 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 60439-1 | NOTE | Harmonized as EN 60439-1:1999 (not modified). |
| IEC 60925 | NOTE | Harmonized as EN 60925:1991 (not modified). |
| IEC 60990 | NOTE | Harmonized as EN 60990:1999 (not modified). |
| IEC 61347 | NOTE | Harmonized in EN 61347 series (partially modified). |

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# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60364-4-42 | -[1)] | Electrical installations of buildings - Part 4-42: Protection for safety - Protection against thermal effects | - | - |
| IEC 60417 | Data-base | Graphical symbols for use on equipment | - | - |
| IEC 60529 | -[1)] | Degrees of protection provided by enclosures (IP Code) | EN 60529<br>+ corr. May | 1991[2)]<br>1993 |
| IEC 60664 | Series | Insulation coordination for equipment within low-voltage systems | EN 60664 | Series |
| IEC/TR 60755 | -[1)] | General requirements for residual current operated protective devices | - | - |
| IEC 60950-1 (mod) | 2005 | Information technology equipment - Safety - Part 1: General requirements | EN 60950-1 | 2006 |
| IEC 61000-2-2 | -[1)] | 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[2)] |
| IEC 61008-1 (mod) | -[1)] | Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCB's) - Part 1: General rules | EN 61008-1<br>+ A11 | 2004[2)]<br>2007 |
| IEC 61009-1 (mod) | -[1)] | Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's) - Part 1: General rules | EN 61009-1<br>+ corr. July<br>+ A11 | 2004[2)]<br>2006<br>2008 |
| IEC 62040-2 | 2005 | Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements | EN 62040-2<br>+ corr. November | 2006<br>2006 |
| IEC 62040-3 (mod) | 1999 | Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements | EN 62040-3 | 2001 |

[1)] Undated reference.

[2)] Valid edition at date of issue.

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# UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

# Part 1: General and safety requirements for UPS

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## 1 Scope and specific applications

### 1.1 Scope

This part of IEC 62040 applies to **uninterruptible power systems** (**UPS**) with an electrical energy storage device in the d.c. link. It is used with IEC 60950-1, which is referred to in this standard as "RD" (reference document).

NOTE **UPS** applications generally make use of a chemical battery as the energy storage device. Alternative devices may be suitable, and as such, where “battery” appears in the text of this standard, where applicable, this may be understood as “energy storage device”.

When a clause is referred to by the phrase "The definitions or the provisions of item/RD apply", this phrase is intended to mean that the definitions or provisions in that clause of IEC 60950-1 apply, except any which are clearly inapplicable to **uninterruptible power systems**. National requirements additional to those in IEC 60950-1 apply and are found as notes under relevant clauses of the RD.

The primary function of the **UPS** covered by this standard is to ensure continuity of an alternating power source. The **UPS** may also serve to improve the quality of the power source by keeping it within specified characteristics.

This standard is applicable to **UPS** which are movable, stationary, fixed or for building-in, for use in low-voltage distribution systems and intended to be installed in any **operator** accessible area or in **restricted access locations** as applicable. It specifies requirements to ensure safety for the **operator** and layman who may come into contact with the equipment and, where specifically stated, for the **service person**.

This standard is intended to ensure the safety of installed **UPS**, both as a single **UPS** unit or as a system of interconnected **UPS** units, subject to installing, operating and maintaining the **UPS** in the manner prescribed by the manufacturer.

This standard does not cover **UPS** based on rotating machines.

Electromagnetic compatibility (EMC) requirements and definitions are given in IEC 62040-2.

### 1.2 Specific applications

Even if this standard does not cover all types of **UPS**, it may be taken as a guide for such equipment. Requirements additional to those specified in this standard may be necessary for specific applications, e.g. related to **UPS** that operate:

– while exposed to extremes of temperature; to excessive dust, moisture, or vibration; to flammable gases; to corrosive or to explosive atmospheres;

– where ingress of water and foreign objects are possible;

NOTE 1 Annex H provides guidance on such requirements and on relevant testing.

– in vehicles, on board ships or aircraft, in tropical countries, or at elevations greater than 1 000 m;

NOTE 2 Guidance for performance of **UPS** operating at elevations greater than 1 000 m is provided in 4.1.1 of IEC 62040-3.

– with trapezoidal output waveforms and long run times (greater than 30 min);

NOTE 3 In addition to complying with 5.3.1.2 of IEC 62040-3, voltage distortion tests for the purpose of load compatibility should also be performed.

– subject to transient overvoltages exceeding those of overvoltage category II according to IEC 60664;

NOTE 4 Subclause G.2.1/RD provides guidance for additional protection against transient overvoltages at the mains supply to the **UPS**. Where such additional protection is an integral part of the equipment insulation requirements, creepage distances and clearance distances from the mains through to the load side of the additional protection may be judged as category III or IV as required. All further downstream insulation requirements, creepage distances, and clearance distances on the load side of the additional protection may be judged as category I or II as required.

– in electromedical applications with the **UPS** located within 1,5 m of the patient contact area;

– in systems classified as emergency power systems by an authority having jurisdiction.

NOTE 5 Additional requirements may also apply in accordance with local regulations.

## 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 60364-4-42, *Electrical installations of buildings – Part 4-42: Protection for safety – Protection against thermal effects*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

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

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

IEC 61000-2-2, *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*

IEC 62040-3:1999, *Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*

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