Irish Standard
I.S. EN 62040-1:2008

Uninterruptible power systems (UPS) -- Part 1: General and safety requirements for UPS (IEC 62040-1:2008 (EQV) + corrigendum Aug. 2008 (EQV))

I.S. EN 62040-1:2008

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:	*This document is based on:*	*Published:*
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62040-1/A1

May 2013

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English version

Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS
(IEC 62040-1:2008/A1:2013)

Alimentations sans interruption (ASI) - Partie 1: Exigences générales et règles de sécurité pour les ASI (CEI 62040-1:2008/A1:2013)

Unterbrechungsfreie Stromversorgungssysteme (USV) - Teil 1: Allgemeine Anforderungen und Sicherheitsanforderungen (IEC 62040-1:2008/A1:2013)

This amendment A1 modifies the European Standard EN 62040-1:2008; it was approved by CENELEC on 2013-02-14. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 62040-1:2008/A1:2013 E

Foreword

The text of document 22H/151/FDIS, future edition 1 of IEC 62040-1:2008/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 62040-1:2008/A1:2013.

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)	2013-11-17
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-02-14

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

Endorsement notice

The text of the International Standard IEC 62040-1:2008/A1:2013 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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.

Addition *to Annex ZA of EN 62040-1:2008:*

Publication	Year	Title	EN/HD	Year
IEC 61439-1	2011	Low-voltage switchgear and controlgear assemblies - Part 1: General rules	EN 61439-1	2011

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I.S. EN 62040-1:2008

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 62040-1

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

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

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

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

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

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 Central Secretariat has the same status as the official versions.

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

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

Ref. No. EN 62040-1:2008 E

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.

The contents of the corrigendum of February 2009 have been included in this copy.

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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).

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 + corr. May	1991[2)] 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 + A11	2004[2)] 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 + corr. July + A11	2004[2)] 2006 2008
IEC 62040-2	2005	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements	EN 62040-2 + corr. November	2006 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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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 1: General and safety requirements for UPS

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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This consolidated version of IEC 62040-1 consists of the first edition (2008) [documents 22H/104/FDIS and 22H/106/RVD], its amendment 1 (2013) [documents 22H/151/FDIS and 22H/155/RVD] and its corrigendum of September 2008. It bears the edition number 1.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

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 standard cancels and replaces the first edition of IEC 62040-1-1, published in 2004 and IEC 62040-1-2, published in 2004 and constitutes a technical revision. This standard merges all requirements of previous IEC 62040-1-1 and IEC 62040-1-2, with the addition of the following:

– update of normative references including IEC 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;
– Amendment 1 introduces short-time withstand current requirements when a short-circuit is applied at the output of the **UPS** (5.5.4).

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

It is to be used with IEC 60950-1, Edition 2.0, which is referred to in this standard as "RD".

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**.

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication 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 publication using a colour printer.

INTRODUCTION TO THE AMENDMENT

This amendment determines the short-time withstand current test requirements for the purpose of verifying the safety of the **UPS** when a short circuit is applied across the output terminals under prescribed modes of operation wherein the output power is delivered by the a.c. input through a **low impedance path**.

UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 1: General and safety requirements for UPS

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 61439-1:2011, *Low-voltage switchgear and controlgear assemblies – 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*