INTERNATIONAL STANDARD

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Uninterruptible power systems (UPS) –

Part 3:
Method of specifying the performance and test requirements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

UNINTERRUPTIBLE POWER SYSTEMS (UPS) – Part 3: Method of specifying the performance and test requirements

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62040-3 has been prepared by subcommittee 22B: Semiconductor converters, of IEC technical committee 22: Power electronics.

This standard cancels and replaces the first edition of IEC 60146-4 published in 1986 as well as IEC 60146-5 (1988), and constitutes a technical revision.

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

FDIS	Report on voting
22B/119/FDIS	22B/122/RVD

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

Annexes E, F and G form an integral part of this standard.

Annexes A, B, C, D, H and I are for information only.

The contents of the corrigendum of July 2003 have been included in this copy.

UNINTERRUPTIBLE POWER SYSTEMS (UPS) –

Part 3: Method of specifying the performance and test requirements

1 Scope and object

This standard applies to electronic indirect a.c. converter systems with electrical energy storage means in the d.c. link. The primary function of the uninterruptible power system (UPS) covered by this standard is to ensure continuity of an alternating power source. The uninterruptible power system may also serve to improve the quality of the power source by keeping it within specified characteristics.

A variety of uninterruptible power systems have been developed to meet consumers' requirements for continuity and quality of power for different types of loads over a wide range of power, from less than 100 W to several megawatts. Refer to annexes A and B for information on some of the types available.

This standard applies to electronic uninterruptible power systems (UPS):

a) delivering single- or three-phase fixed frequency a.c. output voltage;

b) with energy storage device in the d.c. link if not otherwise specified;

c) with rated voltage not exceeding 1 000 V a.c.;

d) movable, stationary and/or fixed equipment.

This standard also includes the method of specifying all power switches that form integral parts of a UPS and are associated with its output.

Included are interrupters, bypass switches, isolating switches, load transfer switches and tie switches. These switches interact with other functional units of the UPS to maintain continuity of load power.

This standard does not refer to conventional mains distribution boards, rectifier input switches or d.c. switches (for example for batteries, rectifier output or inverter input, etc.), or UPS based on rotating machines.

NOTE 1 – This standard recognizes that the major market usage with the UPS ratings within its scope is in conjunction with information technology equipment.

Under current technology, the majority of UPS load equipment employs power supplies which present a non-linear load to the UPS and can be tolerant of non-sinusoidal voltage waveforms for a limited time duration. UPS output ratings are specified to be compatible with non-linear loading and linear loading, subject to manufacturers' declaration if different.

References within this standard to linear loading are retained for test method reasons, or validation of manufacturers' additional declaration.

NOTE 2 – For use of UPS with a non-sinusoidal output voltage waveform, beyond the stored-energy time recommended in this standard, the agreement of the load equipment manufacturer should be sought.

NOTE 3 – For UPS output frequencies other than 50 Hz or 60 Hz, performance specification is subject to agreement between manufacturer and purchaser.

This standard is intended to define a complete uninterruptible power system in terms of its performance and not individual UPS functional units. The individual UPS functional units are dealt with in the IEC publications referred to in the bibliography given in annex I, which apply in so far as they are not in contradiction with this standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 62040. For dated references, subsequent amendments to, or revision of, any of these publications do not apply. However, parties to agreements based on this part of IEC 62040 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050-101:1998, *International Electrotechnical Vocabulary (IEV) – Part 101: Mathematics*

IEC 60050(131):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 131: Electric and magnetic circuits*

IEC 60050(151):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 60050(161):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*
Amendment 1 (1997)

IEC 60050(351):1975, *International Electrotechnical Vocabulary (IEV) – Chapter 351: Automatic control*

IEC 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60050(486):1991, *International Electrotechnical Vocabulary (IEV) – Chapter 486: Secondary cells and batteries*

IEC 60050(551):1998, *International Electrotechnical Vocabulary (IEV) – Chapter 551: Power electronics*

IEC 60050(826):1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests. Tests A: Cold*

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests. Tests B: Dry heat*

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests. Test Ea and guidance: Shock*

IEC 60068-2-32:1975, *Environmental testing – Part 2: Tests. Test Ed: Free fall (Procedure 1)*

IEC 60068-2-48:1982, *Environmental testing – Part 2: Tests. Guidance on the application of the tests of IEC 60068 to simulate the effects of storage*

IEC 60068-2-56:1988, *Environmental testing – Part 2: Tests. Test Cb: Damp heat, steady-state, primarily for equipment*

IEC 60146-1-1:1991, *Semiconductor converters – General requirements and line commutated converters – Part 1-1: Specifications of basic requirements*
Amendment 1 (1996)

IEC 60146-1-2:1991, *Semiconductor converters – General requirements and line commutated converters – Part 1-2: Application guide*

IEC 60146-2:1974, *Semiconductor converters – Part 2: Semiconductor self-commutated convertors*

IEC 60309 (all parts), *Plugs, socket-outlets and couplers for industrial purposes*

IEC 60364-4 (all parts), *Electrical installations of buildings – Part 4: Protection for safety*

IEC 60417-1:1998, *Graphical symbols for use on equipment – Part 1: Overview and application*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60950:1991, *Safety of information technology equipment*

IEC 60990:1990, *Methods of measurement of touch-current and protective conductor current* [1)]

IEC 61000-2-2:1990, *Electromagnetic compatibility (EMC) – Part 2: Environment – Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems*

IEC 61140:1997, *Protection against electric shock – Common aspects for installation and equipment*

IEC 602040-2:—, *Semiconductor converters – Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements*

ISO 7000:1989, *Graphical symbols for use on equipment – Index and synopsis*

ISO/DIS 7779:—, *Acoustics – Measurement of airborne noise emitted by computer and business equipment* [2)]

1) A second edition is at present under consideration.

2) To be published. (Revision of ISO 7779:1988).