भारतीय मानक

Indian Standard

IS 16242 (Part 4) : 2024
IEC 62040-4 : 2013

अबाधित पॉवर प्रणालियाँ (यूपीएस)

भाग 4 पर्यावरणीय पहलू — अपेक्षाएं और रिपोर्टिंग

Uninterruptible Power Systems (UPS)

Part 4 Environmental Aspects — Requirements and Reporting

ICS 13.020.99; 29.200

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November 2024 **Price Group 8**

Power Electronics Sectional Committee, ETD 31

NATIONAL FOREWORD

This Indian Standard (Part 4) which is identical to IEC 62040-4 : 2013 'Uninterruptible power systems (UPS) — Part 4: Environmental aspects — Requirements and reporting' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Power Electronics Sectional Committee and approval of the Electrotechnical Division Council.

This standard is published in various parts. Other parts in this series are:

Part 1 General and safety requirements for UPS

Part 2 Electromagnetic compatibility EMC requirements

Part 3 Method of specifying the performance and test requirements

The text of the IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to International Standards for which Indian Standards also exists. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
IEC 62040-3: 2011, Uninterruptible power systems (UPS) — Part 3: Method of specifying the performance and test requirements	IS 16242 (Part 3) : 2014/IEC 62040-3 : 2011 Uninterruptible power systems (UPS): Part 3 Method of specifying the performance and test requirements	Identical
IEC 62474 Material declaration for Products of and for the electrotechnical industry	IS 18051 : 2022/IEC 62474 : 2020 Material declaration for products of and for the electrotechnical industry	Identical

Only English language text has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the International Standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CONTENTS

INTRODUCTION

The publication of this product standard for environmental information of UPS is intended to become a reference document for regulators, manufacturers, purchasers, certifying bodies and users, so that the goal of promoting reduction of the environmental impact during a complete UPS life cycle is achieved.

This standard provides assistance to:

– determine essential environmental parts of environmental standards, regulations, code of conducts, agreements, and other requirements applicable to UPS to ensure compliance and avoid need of interpretation,

– respond to customer requirements by communicating environmental information in a standardized way,

– minimize reporting requirements by focusing on main applicable environmental requirements,

– anticipate upcoming environmental regulations and environmental programs applicable to UPS by proposing a standard that provides compliance requirements,

– standardize the transmission of environmental information in the supply chain,

– report and communicate environmental information to be used as a reference for measuring environmental progress between one generation of product and the next.

Indian Standard

UNINTERRUPTIBLE POWER SYSTEMS (UPS)

PART 4 ENVIRONMENTAL ASPECTS — REQUIREMENTS AND REPORTING

1 Scope

This part of the IEC 62040 series specifies the process and requirements to declare the environmental aspects concerning uninterruptible power systems (UPS), with the goal of promoting reduction of any adverse environmental impact during a complete UPS life cycle. This product standard is harmonized with the applicable generic and horizontal environmental standards and contains additional details relevant to UPS.

This standard applies to movable, stationary and fixed UPS that deliver single or three-phase fixed frequency a.c. output voltage not exceeding 1 000 V a.c. and that present, generally through a d.c. link, an energy storage system and specified in IEC 62040 product standards for UPS (Part 1: Safety, Part 2: EMC and Part 3: Test and performance).

The following applications are excluded from the scope:

– conventional a.c. input and output distribution boards;
– d.c. distribution boards and their associated switches (e.g. switches for batteries, rectifier output or inverter input);
– stand-alone static transfer systems (STS) specified in IEC 62310 product standards for STS (Part 1: Safety, Part 2: EMC and Part 3: Test and performance);
– systems wherein the output voltage is derived from a rotating machine.

2 Normative references

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.

IEC 62040-3:2011, *Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*

IEC 62474:2012, *Material Declaration for Products of and for the Electrotechnical Industry* (available at http://std.iec.ch/iec62474)

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1
end of life
life cycle stage of a product starting when it is removed from its intended use phase

3.2
end of life treatment
any operations after a waste has been handed over to a facility for recovery or preparation for disposal

Note 1 to entry: This includes dismantling, material separation and disposal.

3.3
use phase
life cycle stage of a product starting when it has been put into service and finishing at end of life

3.4
recycling
processing of waste materials for the original purpose or for other purposes, excluding energy recovery

[SOURCE: ISO 15270:2008,3.30, modified]

3.5
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation

[SOURCE: ISO 14001:2004, 3.5]

3.6
environmental aspect
element of an organization's activities, products or services that can interact with the environment

[SOURCE: ISO 14001:2004, 3.6]

3.7
environmental impact
any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects

[SOURCE: ISO 14001:2004, 3.17]

3.8
environmental management system
part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedure, processes, and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy

[SOURCE: ISO 14001:2004, 3.8, modified]

3.9
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14040:2006,3.1]

3.10
life cycle assessment
LCA
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[SOURCE: ISO 14040:2006, 3.2]

3.11
substance
chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition

[SOURCE: United Nations' Globally Harmonized System of Classification and Labeling (GHS):2011, modified]

3.12
hazardous substances
substance or preparation that can adversely impact the environment with immediate or retarded effect

Note 1 to entry: This definition also applies to preparation.

[SOURCE: IEC Guide 109:2003, 3.6, modified]

3.13
material
substance or mixture within a product or product part

3.14
mixture
solution composed of two or more substances in which they do not react

3.15
uninterruptible power system
UPS
combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure

[SOURCE: IEC 62040-3:2011, 3.1.1]

3.16
raw material
primary or secondary material that is used to manufacture a product

Note 1 to entry: Primary raw material includes commercially produced virgin materials, such as iron ore and wood pulp, used for the manufacturing of products. Secondary raw material includes recycled materials used in the manufacture.

[SOURCE: ISO 14040:2006, 3.15]

3.17
waste
substances or objects which the holder intends or is required to dispose of

Note 1 to entry: Definition obtained from the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (22 March 1989), but is not limited to hazardous waste in this International Standard.

3.18
greenhouse gas
GHG
gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds

Note 1 to entry: GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6).

[SOURCE: ISO 14064-1:2006, 2.1]

3.19
greenhouse gas emission
total mass of a GHG released to the atmosphere over a specified period of time

[SOURCE: ISO 14064-1:2006, 2-5]

3.20
packaging
material that is used to protect or contain a product during transportation, storage, marketing or use

Note 1 to entry: For the purposes of this International Standard, the term "packaging" also includes any item that is physically attached to, or included with, a product or its container for the purpose of marketing the product or communicating information about the product.

[SOURCE: ISO 14021:1999, 3.1.10]

3.21
acoustic noise
unintentional and undesirable sound

3.22
representative UPS
UPS within a range where the information declared for that UPS applies to all the UPS of the range

3.23
component
part that comes from a manufacturing facility and which can be an amalgam of various manufacturing processes and of raw materials

3.24
recyclability rate
sum of recyclable masses of all parts divided by the total mass multiplied by 100 %

3.25
eco-solutions
products or services allowing reduction of environmental impacts of a system in which they are a component

[SOURCE: IEC/PAS 62545:2008, 3.1.16]

4 Process of declaring the environmental aspects of a UPS

4.1 General

The process of declaring the environmental aspects of a UPS consists of identifying those aspects arising when UPS compliance is verified against the requirements specified in Clause 5. The environmental aspects shall be assessed for the representative UPS when applicable and otherwise for each UPS.

NOTE The reporting procedure detailed in this standard is aligned with IEC/PAS 62545.

4.2 Outcome

The outcome of the process is the identification of the environmental impact during a complete UPS life cycle. Compliance with each requirement shall be reported – refer to Annex A and to Annex B.

5 Requirements

5.1 General

This clause specifies the requirements concerning environmental aspects applying to UPS covered by this standard. The environmental aspects are classified as listed in Table 1.

Table 1 – Classification of environmental aspects

Environmental aspects			Suggested format of declaration (clause of annex)
Clause		Classification	
5.2	Essential	Mandatory	A.2
5.3.2	Additional	Voluntary	B.2

5.2 Essential requirements

5.2.1 General

The following subclauses represent the essential requirements.

5.2.2 Information about the producer

The following information shall be declared by the UPS manufacturer:

– location of manufacturing plant(s),
– certification status of manufacturing plant(s) in regard to applicable environmental management system, e.g. ISO 14001, EMAS etc.

5.2.3 Description of the product and its packaging

The following information shall be declared by the UPS manufacturer:

- model (manufacturer's reference and, if model is a representative UPS, the range of UPS),
- UPS configuration (see Annex A of IEC 62040-3:2011),
- UPS performance classification (see 5.3.4. of IEC 62040-3:2011),
- product dimensions,
- mass without energy storage system e.g. batteries,
- mass of energy storage system if incorporated in the UPS,
- mass and material(s) of packaging (e.g. cardboard, plastic, wood, metal):
  - product packaging: first layer of packaging in contact with the product;
  - group packaging: packaging gathering several products into a single package, if applicable;
  - transportation packaging: packaging used for transportation if different from product or group packaging.

NOTE Further information can be found in Table D.1, of IEC 62040-3:2011.

5.2.4 Substances (criterion 1)

Substances contained in the UPS and listed in IEC 62474 as criterion 1 (substances that are currently regulated) shall be declared by the UPS manufacturer.

NOTE 1 This requirement facilitates compliance with laws and regulations applying to substances in a particular IEC member country, e.g. REACH.

NOTE 2 IEC 62474 correlates each reportable substance with typical products containing the same. For guidance and subject to confirmation from the UPS manufacturer, the following substances are generally not present in a UPS:

– azocolourants and azodyes which form certain aromatic amines – used for textiles and leathers;

– cobalt dichloride – used for pneumatic panels to indicate water contamination;

– dimethyl furfumarate (DMF) – used for mould prevention treatment of electronic leather seats;

– formaldehyde – used for textiles.

NOTE 3 The data format described in 6.2 of IEC 62474:2012 represents one method of declaring substances. The full list of reportable substances to be considered is given in IEC 62474 available at http://std.iec.ch/iec62474.

5.2.5 Use phase

The following information shall be declared by the UPS manufacturer:

– UPS efficiency in accordance with IEC 62040-3;

– acoustic noise in accordance with IEC 62040-3.

NOTE Further information can be found in Table D.1 of IEC 62040-3:2011.

5.2.6 End of life

The UPS manufacturer shall provide information to facilitate end of life treatment, e.g. dismantling, disposing, and recycling instructions shall be provided. This information shall include a list of materials and components requiring selective treatment upon end of life.

For recyclability purposes, the manufacturer shall declare if the UPS and its packaging contains any of the following parts:

– parts containing polychlorinated biphenyls (PCB),

– parts containing mercury, such as switches or backlighting lamps,

– batteries,

– printed circuit boards if larger than 10 cm^2,

– toner cartridges, liquid and pasty, as well as colour toner,

– plastic containing regulated flame retardants,

– part containing asbestos,

– cathode ray tubes,

– chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),

– gas discharge lamps,

– liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 $cm^2$and all those back-lighted with gas discharge lamps,

– external electric cables supplied with the UPS e.g. detachable or fixed cords,

– components containing refractory ceramic fibres,

– components containing radioactive substances,

– electrolytic capacitors of height > 25 mm and diameter > 25 mm or proportionately similar volume.

NOTE This requirement facilitates compliance with laws and regulations for waste from electrical and electronic equipment, e.g. EU WEEE directive and EU Battery Directive (2006/66/EC).

5.3 Variation of requirements

5.3.1 General

5.3 describes variations of requirements that manufacturers and purchasers may, under certain conditions, agree on. Such variations may consist of additional or of relaxed environmental aspects to be declared for a particular scope of supply.

5.3.2 Additional requirements

5.3.2.1 General

Notwithstanding that the UPS is deemed complying with this standard when complying with the essential requirements specified, additional environmental requirements can be considered as a result of a voluntary decision by the UPS manufacturer, by regulation, or by UPS application in environmentally sensitive areas. The following subclauses represent such additional requirements.

5.3.2.2 Recyclability rate of the product and its packaging

The UPS manufacturer can provide the recyclability rate of the product and of its packaging

5.3.2.3 Life cycle assessment

The UPS manufacturer can provide a life cycle assessment in accordance with ISO 14040.

NOTE Relevant adverse environmental impacts caused by the UPS relate to the expected energy consumption to produce components for manufacture, to manufacture, to distribute, to install, to use and to end the life (to distribute means to ship a UPS from the factory to the customer using normal transportation means).

5.3.2.4 Substances (criteria 2 and 3)

The status of the substances contained in the UPS and listed in IEC 62474 as criterion 2 (substances forecasted to become regulated but with no effective date) and as criterion 3 (substances declared for information only) can be declared by the UPS manufacturer.

The full list of reportable substances to be considered is given in IEC 62474, database available at http://std.iec.ch/iec62474.

NOTE The data format described in 6.2 of IEC 62474:2012 represents one method of declaring substances.

5.3.3 Relaxation of requirements

Where not infringing local regulations, manufacturers and purchasers may agree on the relaxation of particular essential environmental requirements inferred by conditions prescribed in this standard. Such a relaxation can be necessary when application of the essential requirements result in conflict with specified performance requirement(s).

EXAMPLE The relaxation may consist of:

– omitting selected information in a declaration pertaining to applications wherein proprietary information is not to be publicly disclosed;

– the UPS manufacturer being required to use substances or material different from that declared for their standard UPS product; this can include applications wherein cables are required to be different; an explanatory note should accompany the standard declaration.

5.4 Requirements under consideration

Annex C lists environmental aspects referenced for future consideration and for which no current requirements apply.

Annex A
(normative)

Declaration of essential requirements

A.1 General

This annex summarises the contents required for reporting compliance with the essential requirements of 5.2 and presents a suggested reporting format in Clause A.2

A.2 Declaration format for essential requirements

Essential requirements shall be declared according to Table A.1.

Table A.1 – Declaration format for essential requirements

Subclause IEC 62040-4	Declared environmental aspect	Manufacturer's declared value
5.2.2	Location of manufacturing plant(s)	
	Environmental management system (certification status and name of system)	
5.2.3	Model (manufacturer's reference)	
	Power, rated – apparent	VA
	– active	W
	Representative UPS	__Yes, __No
	Range of UPS covered by representative UPS (if applicable)	
	UPS configuration	
	Performance classification	
	Dimensions (height × width × depth)	mm
	Mass	kg
	Mass of batteries (if integrated)	kg
	Battery technology	
	Product packaging (mass, material)	
	Group packaging, if applicable (mass, material)	
	Transportation packaging , if applicable (mass, material)	
5.2.4	Substances – Criterion 1	
5.2.5	UPS efficiency	
	Acoustic noise	
5.2.6	End of life information (It is recommended to indicate location of the part(s) on a picture or drawing)	

Annex B
(informative)

Declaration for additional requirements

B.1 General

This annex summarises the contents required for reporting compliance with the additional requirements detailed in 5.3.2 and presents a suggested reporting format in Clause B.2.

B.2 Declaration format for additional requirements

Additional requirements shall be declared according to Table B.1.

Table B.1 – Declaration format for additional requirements

Subclause IEC 62040-4	Declared environmental aspect	Manufacturer's declared value
5.3.2.2	Recyclable material, (percentage by mass, calculation method) – in product – in packaging	
5.3.2.3	Life cycle assessment	
5.3.2.4	Substances – criterion 2 – criterion 3	

Annex C
(informative)

Environmental aspects under consideration

C.1 General

This annex describes environmental aspects referenced for future consideration and for which no current requirements apply.

C.2 Environmental aspects for future consideration

The following aspects will be considered in future editions of IEC 62040-4:

a) material contents according to IEC 62474 for assessing the impact of raw material consumption during use and end of life stages;

b) greenhouse gas emission assessment of the UPS in accordance with a standard recognized by IEC and including the generation of emissions during the UPS use and manufacturing life cycle phases;

c) recycling and re-use assessment;

NOTE 1 Assessment method to be determined once the proposed merger of IEC 62650[1] and IEC/TR 62635 is completed.

d) focus beyond energy consumption with respect to life cycle assessment e.g. resource use, natural resource depletion;

e) eco-solutions and their design.

Eco-solutions may be integral to the UPS design consisting for example, of functions including efficiency, maintenance or disposal facilities being implemented.

NOTE 2 Examples include UPS supporting functions that offer significant contribution to reduction of energy consumptions in buildings, plants, etc.

NOTE 3 IEC 62430:2009 can be consulted for further consideration.

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1 Under consideration.

Bibliography

IEC 62040-1:2008, *Uninterruptible power systems (UPS) – Part 1: General and safety requirements for UPS*
Amendment 1:2013

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

IEC 62310-1:2005, *Static transfer systems (STS) – Part 1: General and safety requirements*

IEC 62310-2:2006, *Static transfer systems (STS) – Part 2: Electromagnetic compatibility (EMC) requirements*

IEC 62310-3:2008, *Static transfer systems (STS) – Part 3: Method for specifying performance and test requirements*

IEC 62430:2009*, Environmentally conscious design for electrical and electronic products*

IEC 62535:2008, *Insulating liquids – Test method for detection of potentially corrosive sulphur in used and unused insulating oil*

IEC/PAS 62545:2008, *Environmental information on Electrical and Electronic Equipment (EIEEE)*

IEC/TR 62635, *Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment*

IEC 62650[2], *Communication formats on recycling for electrotechnical equipment between manufacturers and recyclers*

IEC Guide 109:2012, *Environmental aspects – Inclusion in electrotechnical product standards*

ISO 9000:2000, *Quality management systems – Fundamentals and vocabulary*

ISO 14001:2004, *Environmental management systems – Requirements with guidance for use*

ISO 14020:2000, *Environmental labels and declarations – General principles*

ISO 14024:1999, *Environmental labels and declarations – Type I environmental labelling – Principles and procedures*

ISO 14025:2000, *Environmental labels and declarations – Type III environmental declarations*

ISO 14040:2006, *Environmental management – Life cycle assessment – Principles and framework*

ISO 14062:2002, *Environmental management – Integrating environmental aspects into product design and development*

ISO 14064-1, Ed. 1.0, *Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*

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2 Under consideration.

ISO 15270:2008, *Plastics – Guidelines for the recovery and recycling of plastics waste*

European Code of Conduct on energy efficiency and quality of AC Uninterruptible Power Systems (UPS)
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative.htm

Energy Star – UPS specification & test method
http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/uninterruptible_power_supplies/UPS_V1_Draft3_ES_Specification.pdf

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (22 March 1989), http://www.basel.int/

Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labeling of dangerous substances Directive

Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labeling of dangerous preparations

Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

EMAS Eco-Management and Audit Scheme
http://ec.europa.eu/environment/emas/index_en.htm

WEEE Directive: Waste of Electric and Electronic Equipment 2012/19/EU
http://ec.europa.eu/environment/waste/weee/index_en.htm

Battery directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators
http://ec.europa.eu/environment/waste/batteries/index.htm

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This Indian Standard has been developed from Doc No.: ETD 31 (26158).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi