IEC 60335-2-114

Edition 1.0 2018-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical appliances – Safety – Part 2-114: Particular requirements for self-balancing personal transport devices for use with batteries containing alkaline or other non-acid electrolytes

Appareils électrodomestiques et analogues – Sécurité – Partie 2-114: Exigences particulières pour les dispositifs de transport personnel autoéquilibrés destinés à fonctionner avec des accumulateurs alcalins ou autres accumulateurs à électrolyte non acide

IEC 60335-2-114:2018-04(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-114: Particular requirements for self-balancing personal transport devices for use with batteries containing alkaline or other non-acid electrolytes

FOREWORD

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International Standard IEC 60335-2-114 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

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

FDIS	Report on voting
61/5625/FDIS	61/5632/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.

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This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for self-balancing personal transport devices for use with batteries containing alkaline or other non-acid electrolytes.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;
– *test specifications: in italic type;*
– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this standard be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

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INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-114: Particular requirements for self-balancing personal transport devices for use with batteries containing alkaline or other non-acid electrolytes

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the electrical safety of **self-balancing personal transport devices** for use with batteries containing alkaline or other non-acid electrolytes.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance;
– operational safety such as speed restriction, falling hazards, rapid acceleration.

NOTE 101 Attention is drawn to the fact that

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national transport authorities and similar authorities.

NOTE 102 This standard does not apply to

– appliances intended exclusively for industrial purposes;
– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-64, *Environmental testing – Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance*

IEC 61558-2 (all parts), *Safety of power transformers, power supplies, reactors and similar products – Part 2-x: Particular requirements and tests*

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IEC 62133-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 1: Nickel systems*

IEC 62133-2, *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

Addition:

For the purposes of this standard, the terms and definitions given in IEC 62133-2 also apply.

3.1 Definitions relating to physical characteristics

Replacement:

3.1.9
normal operation
operation of the appliance under the conditions specified in 3.1.9.101 to 3.1.9.103

3.1.9.101
the functional part of the **SPTD**, with a fully charged battery is operated in such a way to simulate the riding position and is operated on a continuous belt or rollers. The appliance is loaded with a mass of 100 kg or the maximum load specified in the instructions, whichever is higher. The motors are loaded to 66 % of their locked rotor current by adjusting the load on its rotational axis in the forward direction.

3.1.9.102
the functional part of the **SPTD** incorporating a discharged battery that is recharged in the appliance is connected to its **detachable power supply part** and the discharged battery is fully recharged

3.1.9.103
discharged batteries that are not recharged in the appliance are connected to a battery charger and fully recharged

3.1.101
cycle (tc)
time required for the fully charged battery to be discharged (td) while under the conditions of **normal operation** until the appliance no longer operates plus the time required for the battery to be fully recharged (tr) from this discharged condition

Note 1 to entry: tc = td + tr

3.5 Definitions relating to types of appliances

3.5.101
self-balancing personal transport device
SPTD
appliance comprising a **detachable power supply part** and a functional part

Note 1 to entry: The functional part has one or more wheels controlled by the self-adaption of the body of the user and is powered by rechargeable batteries with one or more motors to drive one or more wheels.

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Note 2 to entry: The functional part may incorporate the battery charging circuitry and other supply unit circuitry. (See Annex B item b)).

Note 3 to entry: The term battery as used throughout this document means “secondary battery” as defined in IEC 62133-1 and 62133-2.

3.6 Definitions relating to parts of an appliance

3.6.2 *Addition:*

Note 101 to entry: If a part has to be removed with a **tool** solely to discard the battery before scrapping the appliance, this part is not considered to be a **detachable part** even if the instructions state that it is to be removed.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Addition:*

The functional part of a **SPTD** shall be of **class III construction**.

6.2 *Addition:*

The functional part of a **SPTD** shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

The functional part of the **SPTD** shall be marked with symbol IEC 60417-5001B (2004-09) and its type reference along with symbol ISO 7000-0790 (2004-01) or with the substance of the following:

Use only with <model designation> battery

Batteries that are detachable shall be marked with their type reference and with the substance of the following:

Use only with <model designation> self-balancing personal transport device

The functional part of the **SPTD** shall be marked with the maximum load in kg with which the **SPTD** can be operated.

The functional part of the **SPTD** intended for use off-road shall be marked with the IP first numeral 5.

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7.6 *Addition:*

[symbol IEC 60417-5001B (2004-09)]	battery

7.12 *Addition:*

The instructions shall state the maximum load in kg with which the **SPTD** can be operated.

For **SPTDs** intended for use with lithium-ion batteries the instructions shall state the

– normal temperature range for charging the battery. This temperature range shall be within the range T2 to T3 specified in IEC 62133-2;
– end-of-discharge voltage;
– upper limit of the charging voltage, for batteries comprising series connected cells;
– rated capacity of the battery (C_5 Ah).

7.14 *Addition:*

The height of the marking indicating the maximum load with which the **SPTD** can be operated shall be at least 10 mm.

7.15 *Addition:*

The maximum load in kg with which the **SPTD** can be operated, shall be visible when the **SPTD** is in use.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Addition:*

*The **SPTD** is placed on the floor of the test corner and away from the walls.*

11.5 *Replacement:*

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*For **SPTDs** where the battery is charged in the appliance, when operating as specified in 3.1.9.102, the appliance is supplied with the most unfavourable voltage between 0,94 times and 1,06 times the **rated voltage**.*

11.7 *Replacement:*

The appliance is subjected to the tests of 11.7.1, 11.7.2 and 11.7.3.

11.7.1 *For appliances supplied with only one battery that is charged within the functional part of the **SPTD**, the appliance is operated for two **cycles**.*

11.7.2 *For appliances supplied with only one battery that is not charged within the **SPTD** the functional part of the **SPTD** is operated as specified in 3.1.9.101 until the appliance no longer operates. The battery is then recharged as specified in 3.1.9.103. The tests are then repeated.*

11.7.3 *For appliances supplied with additional batteries, with the first battery installed or connected the functional part of the **SPTD** is operated as specified in 3.1.9.101 until the appliance no longer operates. An additional battery is then connected and the functional part of the **SPTD** is again operated as specified in 3.1.9.101 until the appliance no longer operates. The batteries are then recharged as specified in 3.1.9.102 or 3.1.9.103 as applicable. The test is then repeated using each additional battery in turn.*

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1 *Addition:*

Inspection shall show that there is no trace of water within compartments that house electrical parts.

15.101 The functional part of the **SPTD** shall have adequate protection against the effects of immersion.

Compliance is checked by the following test.

*The functional part of the **SPTD** fitted with a fully charged battery, is partially immersed to a depth just below the foot support surface area in water containing approximately 1 % NaCl and having a temperature between 10 °C and 25 °C.*

*For appliances supplied with batteries that are charged within the **SPTD**, after 5 min, the functional part of the **SPTD** shall then be removed from the water, after which the **SPTD** shall be operated under **normal operation** for one **cycle**.*

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