IEC 60335-2-111

Edition 1.0 2015-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical appliances – Safety – Part 2-111: Particular requirements for electric ondol mattress with a non-flexible heated part

Appareils électrodomestiques et analogues – Sécurité – Partie 2-111: Exigences particulières pour les matelas électriques ondol avec une partie chauffée non flexible

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-111: Particular requirements for electric ondol mattress with a non-flexible heated part

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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International Standard IEC 60335-2-111 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

It forms the first edition of IEC 60335-2-111.

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

FDIS	Report on voting
61/4826/FDIS	61/4873/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.

This publication 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.

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 electric ondol mattress with a non-flexible heated part.

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.

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 its publication.

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.

The committee has decided that the contents of this publication 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
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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 2-111: Particular requirements for electric ondol mattress with a non-flexible heated part

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric **ondol-mattresses** for household and similar purposes, their rated voltage being not more than 250 V.

This standard also applies to **control units** supplied with the appliance.

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 in community spas or by persons in cold ambient temperatures, 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

– the use of appliances by young children or infirm persons without supervision;
– playing with the appliance by young children.

NOTE 101 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);
– blankets, pads and similar flexible heating appliances (IEC 60335-2-17);
– room heaters (IEC 60335-2-30);
– water bed heaters (IEC 60335-2-66);
– heating appliances for breeding and rearing animals (IEC 60335-2-71);
– foot warmers and heating mats (IEC 60335-2-81);
– flexible sheet heating elements for room heating (IEC 60335-2-96);
– heated carpets and for heating units for room heating installed under removable floor coverings (IEC 60335-2-106);
– appliances specifically intended for use under medical supervision (IEC 80601-2-35).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

ISO 2439, *Flexible cellular polymeric materials – Determination of hardness (indentation technique)*

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3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*
normal operation
operation of the appliance under the following conditions:

The **ondol-mattress** is placed on the floor of the test corner away from the walls, any legs forming part of the **bed frame** being removed.

The base of the **bed frame** is replaced by a piece of 20 mm thick plywood. The ondol-plate is covered by a sheet of thermal insulation.

Note 1 to entry: The specification for the thermal insulation is given in Annex AA.

3.101
heating element
heating conductor such as a heating sheet or wires covered with insulation material

3.102
ondol-mattress
appliance comprising an ondol-plate that incorporates an imbedded **heating element** that heats the ondol-plate, and a **bed frame** that supports the ondol-plate

Note 1 to entry: Ondol-plates are usually made from inorganic material such as stone or loess.

3.103
control unit
device, incorporated in the **bed frame** or external to the **bed frame**, by means of which the average power input of the appliance can be adjusted or regulated

Note 1 to entry: Multi-position cord switches are not considered to be **control units** unless they incorporate components for regulating the power input.

3.104
controlled appliance
appliance incorporating means in the **ondol-mattress** for sensing changes in temperature when the appliance is operated under **normal operation**, thus automatically controlling the average power input

3.105
bed frame
frame that supports the ondol-plate

Note 1 to entry: The **bed frame** may incorporate legs to provide a gap between the underside of the ondol-plate and the floor.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.8.101 ***Controlled appliances*** *are supplied as specified for* ***motor-operated appliances****.*

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6 Classification

This clause of Part 1 is applicable.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances shall be marked with

– the **rated power input**;
– symbol ISO 7000-0790 (2004-01) or "Please read the instructions";
– symbol ISO 7000-0434A (2004-01) or Caution: Do not use with a helpless person, an infant or a person insensitive to heat.

Appliances to be used with a **detachable control unit** shall be marked with the reference of the **control unit** to be used.

Appliances to be used with a **detachable transformer** shall be marked with the reference of the transformer to be used.

Detachable control units and **detachable transformers** shall be marked with the reference of the appliances with which they can be used.

7.12 *Addition:*

The instructions shall contain the substance of the following:

Important instructions. Retain for future use.

The instructions shall contain the substance of the instructions required in 7.1. If symbols are used, they shall be explained.

The instructions shall specify the appropriate settings of controls for continuous use of the appliance.

This appliance is not intended for medical use in a hospital.

This appliance must not be used by persons insensitive to heat and other very vulnerable persons who are unable to react to overheating.

The instructions for appliances provided with **detachable control units** or **detachable transformers** shall state that the appliance is only to be used with the types that are marked on the appliance.

Examine the appliance frequently for signs of wear or damage. If there are such signs, if the appliance has been misused or does not work, discontinue use and notify the supplier.

7.101 Detachable control units shall be marked with a reference number or by other means of identification.

Compliance is checked by inspection.

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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 *Modification:*

When there is a ***separate control unit****, it is placed away from the appliances.*

11.3 *Addition:*

Thermocouples used for determining the surface temperature of the ***ondol-mattress*** *are soldered to plates of copper or brass measuring 65 mm × 65 mm × 0,5 mm. The temperatures are determined in at least four places.*

11.7 *Replacement:*

Appliances are operated until steady conditions are established.

11.8 *Addition:*

The surface temperature of the ***ondol-mattress*** *shall not exceed 56 °C.*

11.101 It shall be possible to operate the **ondol-mattress** without risk of heatstroke to the user.

Compliance is checked by the following test.

The appliance is operated under ***normal operation*** *supplied as specified in 11.4. The control units or cord switch is adjusted to the highest setting recommended for continuous use.*

When steady conditions are established, but at least 1 h after switching on the appliance, the surface temperature is measured. The temperature of the surface of the ***ondol-mattress*** *is determined by means of a thermocouple attached to the centre of a plate of copper or brass having dimensions 300 mm × 300 mm × 0,5 mm.*

The temperature shall not exceed 37 °C.

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12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1 *Modification:*

*For testing the **ondol-mattress**, a sheet of metal foil, approximately 0,1 mm thick and of sufficient size to cover the area of that part of the **ondol-mattress** incorporating the current-carrying parts, is inserted between the **ondol-mattress** and the sheet of thermal insulation. A uniformly distributed load of approximately 35 kg/m^2 is placed on the sheet of thermal insulation.*

The arrangement is shown in Figure 101.

13.2 *Modification:*

The leakage current is measured between any pole of the supply and the sheet of metal foil.

*The leakage current for the **ondol-mattress** shall not exceed 1 mA/m^2 of the heating part with a maximum of 2,5 mA.*

13.3 *Modification:*

*For the **ondol-mattress**, the test voltage is applied between **live parts** and the sheet of metal foil.*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Addition:*

*A quantity of the solution corresponding to 1 l/m^2 of the upper surface area of the **ondol-mattress** is poured uniformly over the **ondol-mattress** at the rate of approximately 1 l/min.*

*The solution is allowed to soak into the **ondol-mattress** for a period of 30 min.*

*After 30 min, the appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of water on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Addition:*

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