

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

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision

This edition includes the following significant technical changes with respect to the previous edition:

- a) alignment with IEC 60335-1:2020;
- b) conversion of some notes to normative text (Clause 1);
- c) application of test probe 19 has been introduced (8.1.1, 20.2, B.22.3, B.22.4).

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

Draft	Report on voting
61/7280/FDIS	61/7303/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) 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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can 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 publication 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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

<https://www.iec.ch/tc61/supportingdocuments>

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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 can 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 publications, basic safety publications and group safety publications 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.

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.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

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 part of IEC 60335 deals with the safety of electric **ondol-mattresses** for household and similar purposes, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

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

Appliances not intended for normal household use, but that nevertheless can 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

- persons (including children) whose
 - physical, sensory or mental capabilities; or
 - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

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 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)*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Modification:* **normal operation**

Replace the first paragraph with the following:

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 101 to entry: The specification for the thermal insulation is given in normative Annex AA.

3.5 Definitions relating to types of appliances

3.5.101

ondol-mattress

appliance comprising an ondol-plate that incorporates an embedded **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.

3.5.102

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

3.6 Definitions relating to parts of an appliance

3.6.101

heating element

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

3.6.102

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.

3.6.103

bed frame

frame that supports the ondol-plate

Note 1 to entry: The **bed frame** can 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.*

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 the substance of "Please read the instructions";
- symbol ISO 7000-0434A (2004-01) or the substance of "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 **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.

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.

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.

The instructions shall contain the substance of the markings 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.

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.

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

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 Addition:

In addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

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:

*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 Modification:

Replace the first paragraph with the following:

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 unit** 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.

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

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 a size necessary 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/m² 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/m² 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 spillage solution corresponding to 1 l/m² 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 spillage 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:

*A sheet of metal foil, approximately 0,1 mm thick and of a size necessary 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/m² is placed on the top sheet of thermal insulation.*

The leakage current for the heating part shall not exceed 2,5 mA.

16.3 Addition:

*After the **ondol-mattress** is covered with metal foil, it is tested with the voltage applied between **live parts** and the sheet of metal foil.*

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Modification:

Instead of the tests specified, the following applies.

The appliance is subjected to the tests of 19.101 and 19.102.