

INTERNATIONAL STANDARD



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

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INTERNATIONAL STANDARD



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

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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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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-111:2015. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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 ~~may~~ 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 and generic standards~~ 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. ~~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.

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 ~~may~~ 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

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

~~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 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 ~~Replacement~~ 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 4101 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

3.102

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 ~~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.

3.104

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 ~~6.103~~

bed frame

frame that supports the ondol-plate

Note 1 to entry: The **bed frame** ~~may~~ 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 ~~Modification~~ 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 ~~Replacement~~ 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 ~~Void~~ 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 ~~sufficient~~ 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 ~~sufficient~~ 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 ~~and 19.103~~.

*The appliances incorporating **electronic circuits** are also subjected to the tests of 19.11, 19.12 and 19.14.*

The appliance is supplied with a voltage

- *between 0,9 times and 1,1 times the **rated voltage**, for **controlled appliances**;*
- *resulting in a power input between 0,85 times and 1,24 times the **rated power input**, for other appliances.*

19.13 Addition:

*The temperature of the surface of the **ondol-mattress** shall not exceed 80 °C.*

19.101 *Appliances are operated under **normal operation** except that the sheet of thermal insulation covers only part of the ondol-mattress. The test is carried out eight times, the boundary of the area covered being in turn parallel to each of the sides and to the diagonals of the **ondol-mattress** as shown in Figure 102.*

19.102 *Appliances are operated under the conditions specified in Clause 11. Any control that limits the temperature during the test of Clause 11 is short-circuited.*

19.103 Ondol-mattresses shall be constructed so that failure of a component, other than **heating elements** or internal wiring, does not give rise to a temperature which could be hazardous to the human body.

*Compliance is checked by carrying out the test of 11.101 but simulating failure of components which might reasonably be expected to occur in normal use. During the test, the temperature of the surface of the **ondol-mattress** shall not exceed 56 °C.*

*Appliances can have one overshoot of up to 85 °C provided that when the temperature exceeds 56 °C a **non-self-resetting thermal cut-out** operates.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 Addition:

*The test is only applied to **control units** intended to be placed on a surface.*

20.2 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.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 Addition:

Control units intended to be placed on a surface are also subjected to the test of 21.101.

21.101 The **control unit** is dropped from a height of 40 mm onto a rigidly mounted steel plate having a thickness of at least 15 mm and a mass of at least 15 kg. It is dropped so that it lands on its base, the test being carried out 100 times.

A sandbag with the weight of 80 kg and a square bottom with a length of 300 mm on each side is placed on the **control unit** for 1 min.

The **control unit** is then dropped three times from a height 500 mm onto a hardwood floor by pulling it from a horizontal support by means of its cord so that it falls freely.

After the test, the **control unit** shall not be damaged to such an extent that compliance with this standard is impaired. If the **control unit** still operates, the appliance shall withstand the tests of Clause 11.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 The **ondol-mattress** shall be constructed so that **heating elements** and internal wiring are retained in their intended position. No part of the **heating element** shall cross over another part of the **heating element**.

Crossing of internal wiring shall be avoided ~~as far as possible. When this is unavoidable, unless the wiring shall be~~ is secured in order to prevent any relative movement.

Compliance is checked by inspection.

22.102 The insulation of **heating elements** and internal wiring shall be integral with the conductors in the heating part, for other than **class III construction**.

Compliance is checked by inspection.

22.103 **Control units** intended to stand on a table shall not have openings on the underside that could allow small items to penetrate and touch live parts.

*Compliance is checked by inspection and measuring the distance between the supporting surface and **live parts** through openings. This distance shall be at least 8 mm.*

22.104 **Control units** that automatically switch from a high heat output to a low heat output after a pre-set time shall not automatically switch back to the high heat output setting.

Compliance is checked by inspection and during the test of 11.101.

22.105 Fuse links or **thermal links** that are incorporated to protect the **ondol-mattress** against overheating or ignition shall not be replaceable by the user.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 Modification:

Thermostats are operated for 100 000 cycles of operation and **self-resetting thermal cut-outs** for 10 000 cycles of operation.

24.2 Addition:

Appliances may be fitted with switches or **control units** in flexible cords.

24.101 Thermal cut-outs incorporated in appliances for compliance with 19.102 shall not be self-resetting.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.2 Addition:

Ondol-mattresses having two separate **heated areas** may have two means of connection to the supply.

25.15 Modification:

Flexible cords connected to the **ondol-mattress** are subjected to a pull force of 100 N that is only applied three times for 1 min each time, the longitudinal measurement not being made.

Flexible cords connected to switches and **control units** are subjected to a pull force of 100 N.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.2 Addition:

The requirement does not apply to the connections to the **heating elements**.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

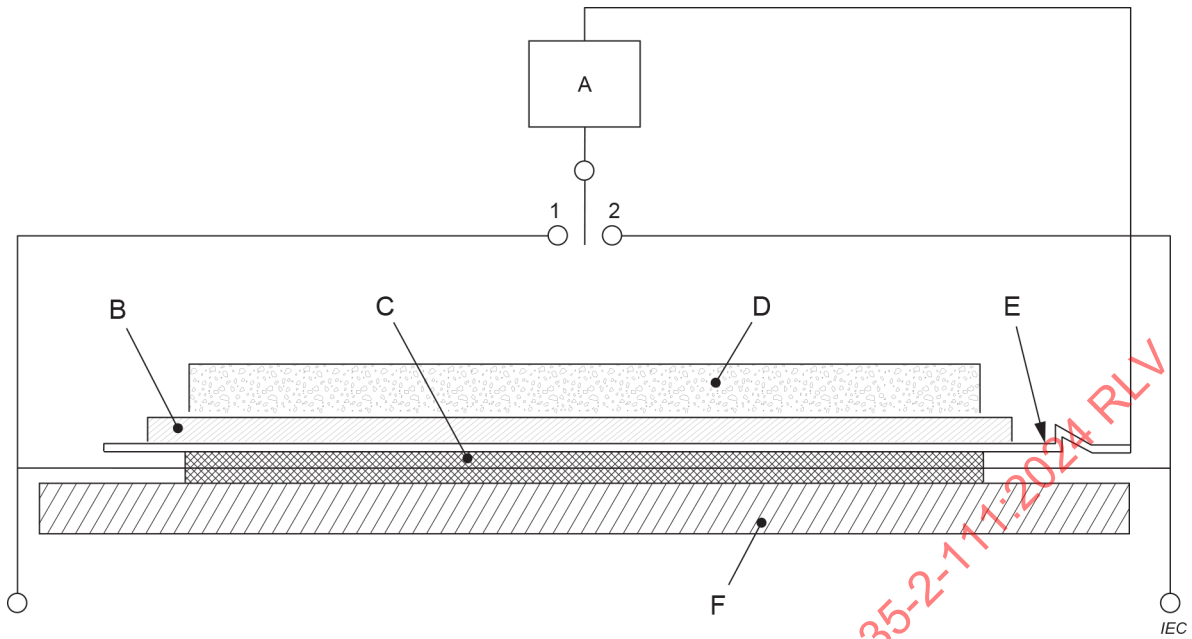
31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

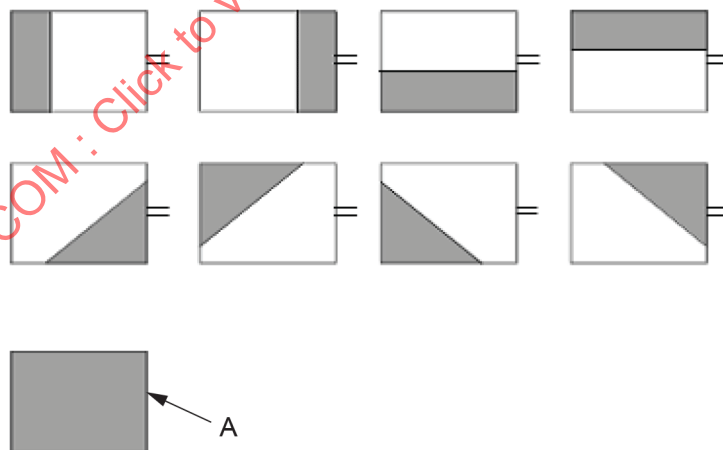
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Key

- A circuit of Figure 4 of IEC 60990:2016
- B sheet of thermal insulation
- C **ondol-mattress**
- D uniformly distributed load
- E aluminium foil
- F plywood base

Figure 101 – Arrangement for measuring leakage current and electric strength of the ondol-mattress



IEC

Key

- A thermal insulation

Figure 102 – Positioning of the thermal insulation on an ondol-mattress incorporating thermostats

Annexes

The annexes of Part 1 are applicable except as follows:

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Annex B (normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

Annex B of Part 1 Is applicable except as follows.

B.22.3 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.

B.22.4 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.

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Annexe A (normative)

Specification for thermal insulation

The thermal insulation has the following composition:

- *cell count:* $18 \begin{smallmatrix} +2 \\ 0 \end{smallmatrix}$ per cm
- *specific mass:* $30 \text{ kg/m}^3 \begin{smallmatrix} +10 \\ 0 \end{smallmatrix} \%$
- *hardness:* 120 N to 170 N at 40 % impression, measured according to ISO 2439
- *thickness:* 25 mm

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Bibliography

The Bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-17, *Household and similar electrical appliances – Safety – Part 2-17: Particular requirements for blankets, pads and similar flexible heating appliances*

IEC 60335-2-30, *Household and similar electrical appliances – Safety – Part 2-30: Particular requirements for room heaters*

IEC 60335-2-66, *Household and similar electrical appliances – Safety – Part 2-66: Particular requirements for water-bed heaters*

IEC 60335-2-71, *Household and similar electrical appliances – Safety – Part 2-71: Particular requirements for electrical heating appliances for breeding and rearing animals*

IEC 60335-2-81, *Household and similar electrical appliances – Safety – Part 2-81: Particular requirements for foot warmers and heating mats*

IEC 60335-2-96, *Household and similar electrical appliances – Safety – Part 2-96: Particular requirements for flexible sheet heating elements for room heating*

IEC 60335-2-106, *Household and similar electrical appliances – Safety – Part 2-106: Particular requirements for heated carpets and for heating units for room heating installed under removable floor coverings*

IEC 80601-2-35, *Medical electrical equipment – Part 2-35: Particular requirements for the basic safety and essential performance of heating devices using blankets, pads and mattresses and intended for heating in medical use*

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.

The appliances incorporating **electronic circuits** are also subjected to the tests of 19.11, 19.12 and 19.14.

The appliance is supplied with a voltage

- between 0,9 times and 1,1 times the **rated voltage**, for **controlled appliances**;
- resulting in a power input between 0,85 times and 1,24 times the **rated power input**, for other appliances.

19.13 Addition:

The temperature of the surface of the **ondol-mattress** shall not exceed 80 °C.

19.101 Appliances are operated under **normal operation** except that the sheet of thermal insulation covers only part of the ondol-mattress. The test is carried out eight times, the boundary of the area covered being in turn parallel to each of the sides and to the diagonals of the **ondol-mattress** as shown in Figure 102.

19.102 Appliances are operated under the conditions specified in Clause 11. Any control that limits the temperature during the test of Clause 11 is short-circuited.

19.103 Ondol-mattresses shall be constructed so that failure of a component, other than **heating elements** or internal wiring, does not give rise to a temperature which could be hazardous to the human body.

Compliance is checked by carrying out the test of 11.101 but simulating failure of components which might reasonably be expected to occur in normal use. During the test, the temperature of the surface of the **ondol-mattress** shall not exceed 56 °C.

Appliances can have one overshoot of up to 85 °C provided that when the temperature exceeds 56 °C a **non-self-resetting thermal cut-out** operates.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 Addition:

The test is only applied to **control units** intended to be placed on a surface.

20.2 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.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 Addition:

Control units intended to be placed on a surface are also subjected to the test of 21.101.

21.101 The **control unit** is dropped from a height of 40 mm onto a rigidly mounted steel plate having a thickness of at least 15 mm and a mass of at least 15 kg. It is dropped so that it lands on its base, the test being carried out 100 times.

A sandbag with the weight of 80 kg and a square bottom with a length of 300 mm on each side is placed on the **control unit** for 1 min.

The **control unit** is then dropped three times from a height 500 mm onto a hardwood floor by pulling it from a horizontal support by means of its cord so that it falls freely.

After the test, the **control unit** shall not be damaged to such an extent that compliance with this standard is impaired. If the **control unit** still operates, the appliance shall withstand the tests of Clause 11.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 The **ondol-mattress** shall be constructed so that **heating elements** and internal wiring are retained in their intended position. No part of the **heating element** shall cross over another part of the **heating element**.

Crossing of internal wiring shall be avoided unless the wiring is secured in order to prevent any relative movement.

Compliance is checked by inspection.

22.102 The insulation of **heating elements** and internal wiring shall be integral with the conductors in the heating part, for other than **class III construction**.

Compliance is checked by inspection.

22.103 **Control units** intended to stand on a table shall not have openings on the underside that could allow small items to penetrate and touch live parts.

*Compliance is checked by inspection and measuring the distance between the supporting surface and **live parts** through openings. This distance shall be at least 8 mm.*

22.104 **Control units** that automatically switch from a high heat output to a low heat output after a pre-set time shall not automatically switch back to the high heat output setting.

Compliance is checked by inspection and during the test of 11.101.

22.105 Fuse links or **thermal links** that are incorporated to protect the **ondol-mattress** against overheating or ignition shall not be replaceable by the user.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 Modification:

Thermostats are operated for 100 000 cycles of operation and **self-resetting thermal cut-outs** for 10 000 cycles of operation.

24.2 Addition:

Appliances may be fitted with switches or **control units** in flexible cords.

24.101 Thermal cut-outs incorporated in appliances for compliance with 19.102 shall not be self-resetting.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.2 Addition:

Ondol-mattresses having two separate **heated areas** may have two means of connection to the supply.

25.15 Modification:

Flexible cords connected to the **ondol-mattress** are subjected to a pull force of 100 N that is only applied three times for 1 min each time, the longitudinal measurement not being made.

Flexible cords connected to switches and **control units** are subjected to a pull force of 100 N.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.2 Addition:

The requirement does not apply to the connections to the **heating elements**.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

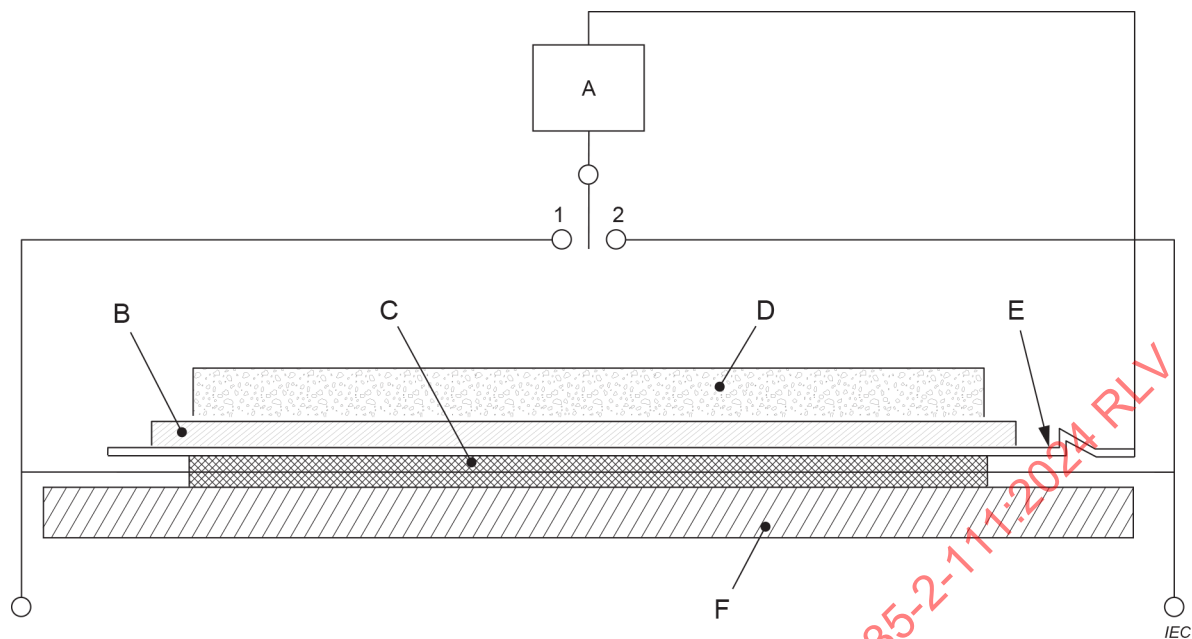
31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

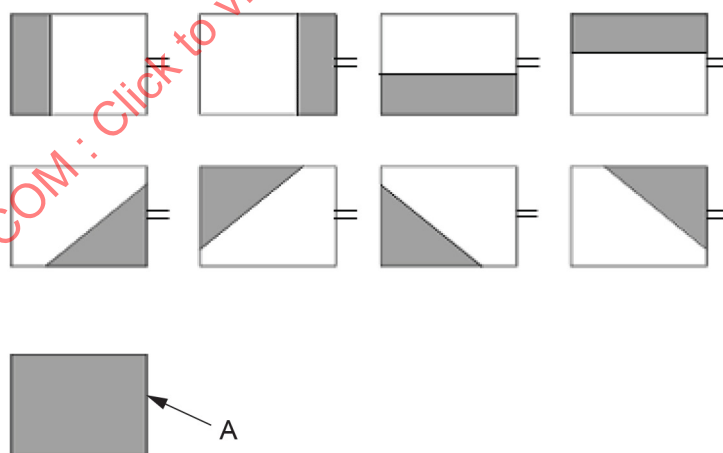
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Key

- A circuit of Figure 4 of IEC 60990:2016
- B sheet of thermal insulation
- C **ondol-mattress**
- D uniformly distributed load
- E aluminium foil
- F plywood base

Figure 101 – Arrangement for measuring leakage current and electric strength of the ondol-mattress



IEC

Key

- A thermal insulation

Figure 102 – Positioning of the thermal insulation on an ondol-mattress incorporating thermostats

Annexes

The annexes of Part 1 are applicable except as follows:

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Annex B (normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

Annex B of Part 1 Is applicable except as follows.

B.22.3 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.

B.22.4 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.

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Annex AA (normative)

Specification for thermal insulation

The thermal insulation has the following composition:

- *cell count:* 18^{+2}_0 per cm
- *specific mass:* $30 \text{ kg/m}^3^{+10}_0$ %
- *hardness:* 120 N to 170 N at 40 % impression, measured according to ISO 2439
- *thickness:* 25 mm

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Bibliography

The Bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-17, *Household and similar electrical appliances – Safety – Part 2-17: Particular requirements for blankets, pads and similar flexible heating appliances*

IEC 60335-2-30, *Household and similar electrical appliances – Safety – Part 2-30: Particular requirements for room heaters*

IEC 60335-2-66, *Household and similar electrical appliances – Safety – Part 2-66: Particular requirements for water-bed heaters*

IEC 60335-2-71, *Household and similar electrical appliances – Safety – Part 2-71: Particular requirements for electrical heating appliances for breeding and rearing animals*

IEC 60335-2-81, *Household and similar electrical appliances – Safety – Part 2-81: Particular requirements for foot warmers and heating mats*

IEC 60335-2-96, *Household and similar electrical appliances – Safety – Part 2-96: Particular requirements for flexible sheet heating elements for room heating*

IEC 60335-2-106, *Household and similar electrical appliances – Safety – Part 2-106: Particular requirements for heated carpets and for heating units for room heating installed under removable floor coverings*

IEC 80601-2-35, *Medical electrical equipment – Part 2-35: Particular requirements for the basic safety and essential performance of heating devices using blankets, pads and mattresses and intended for heating in medical use*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES –
SÉCURITÉ –****Partie 2-111: Exigences particulières pour les matelas électriques
ondol avec une partie chauffée non flexible****AVANT-PROPOS**

- 1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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- 9) L'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de brevet revendiqué à cet égard. À la date de publication du présent document, l'IEC n'avait pas reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Toutefois, il y a lieu d'avertir les responsables de la mise en application du présent document que des informations plus récentes sont susceptibles de figurer dans la base de données de brevets, disponible à l'adresse <https://patents.iec.ch>. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

L'IEC 60335-2-111 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2015. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) le texte a été aligné sur l'IEC 60335-1:2020;
- b) certaines notes ont été converties en texte normatif (Article 1);
- c) l'application du calibre d'essai 19 a été introduite (8.1.1, 20.2, B.22.3, B.22.4).

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
61/7280/FDIS	61/7303/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

La version française de la norme n'a pas été soumise au vote.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 60335, publiées sous le titre général *Appareils électrodomestiques et analogues – Sécurité*, se trouve sur le site web de l'IEC.

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements sauf si cette édition l'exclut. Dans ce cas, la dernière édition qui n'exclut pas la présente partie 2 est utilisée. Elle a été établie sur la base de la sixième édition (2020) de cette norme.

NOTE 1 L'expression "la Partie 1" utilisée dans la présente norme fait référence à l'IEC 60335-1.

La présente Partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences de sécurité pour les matelas électriques ondul avec une partie chauffée non flexible.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans cette partie 2, ce paragraphe s'applique pour autant que cela soit raisonnable. Lorsque la présente norme mentionne "addition", "modification" ou "remplacement", le texte correspondant de la Partie 1 doit être adapté en conséquence.

NOTE 2 Le système de numérotation suivant est utilisé:

- les paragraphes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101;
- à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles des articles ou paragraphes qui sont remplacés;
- les annexes qui sont ajoutées sont désignées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

- exigences: caractères romains;
- modalités d'essais: caractères italiques;
- notes: petits caractères romains.

Les termes en **gras** dans le texte sont définis à l'Article 3. Lorsqu'une définition concerne un adjectif, l'adjectif et le nom associé figurent également en gras.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

NOTE 4 L'attention des Comités nationaux est attirée sur le fait que les fabricants d'appareils et les organismes d'essai peuvent avoir besoin d'une période transitoire après la publication d'une nouvelle publication IEC, ou d'une publication amendée ou révisée, pour fabriquer des produits conformes aux nouvelles exigences et pour adapter leurs équipements aux nouveaux essais ou aux essais révisés.

Le comité recommande que le contenu de cette publication soit adopté pour application nationale (obligatoire) au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

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INTRODUCTION

Il a été admis par hypothèse, en établissant la présente Norme internationale, que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

Les documents de recommandations concernant l'application des exigences de sécurité pour les appareils peuvent être consultés dans les documents de support du CE 61, accessibles sur le site web de l'IEC à l'adresse:

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

Cette information est donnée à l'intention des utilisateurs de la présente Norme internationale et ne constitue nullement un remplacement du texte normatif de la présente norme.

La présente norme reconnaît le niveau de protection internationalement accepté contre les risques électriques, mécaniques, thermiques, liés au feu et au rayonnement des appareils, lorsqu'ils fonctionnent comme en usage normal en tenant compte des instructions du fabricant. Elle couvre également les situations anormales auxquelles on peut s'attendre dans la pratique et elle tient compte de la façon dont les phénomènes électromagnétiques peuvent affecter le fonctionnement sûr des appareils.

La présente norme tient compte autant que possible des exigences de l'IEC 60364, de façon à rester compatible avec les règles d'installation quand l'appareil est raccordé au réseau d'alimentation. Cependant, des règles nationales d'installation peuvent être différentes.

Si un appareil relevant du domaine d'application de la présente norme comporte également des fonctions couvertes par une autre partie 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela s'applique, l'influence d'une fonction sur les autres fonctions est prise en compte.

Lorsqu'une partie 2 ne comporte pas d'exigences complémentaires pour couvrir les dangers traités dans la Partie 1, la Partie 1 s'applique.

NOTE 1 Cela signifie que les comités d'études responsables pour les parties 2 ont déterminé qu'il n'était pas nécessaire de spécifier des exigences particulières pour l'appareil en question en plus des exigences générales.

La présente norme est une norme de famille de produits traitant de la sécurité d'appareils et a préséance sur les normes horizontales et génériques couvrant le même sujet.

NOTE 2 Les publications horizontales, les publications fondamentales de sécurité et les publications groupées de sécurité couvrant un danger ne s'appliquent pas, parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335.

Un appareil conforme au texte de la présente norme ne sera pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

Un appareil utilisant des matériaux ou présentant des modes de construction différents de ceux décrits dans les exigences de la présente norme peut être examiné et soumis aux essais en fonction de l'objectif poursuivi par ces exigences et, s'il est jugé pratiquement équivalent, il peut être estimé conforme aux principes de sécurité de la présente norme.

NOTE 3 Les normes traitant des aspects non relatifs à la sécurité des appareils électrodomestiques sont:

- les normes IEC publiées par le comité d'études 59 concernant les méthodes de mesure d'aptitude à la fonction;
- les normes CISPR 11 et CISPR 14-1, ainsi que les normes applicables de la série IEC 61000-3 concernant les émissions électromagnétiques;
- la norme CISPR 14-2 concernant l'immunité électromagnétique;
- les normes IEC publiées par le comité d'études 111 concernant l'environnement.

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-111: Exigences particulières pour les matelas électriques ondol avec une partie chauffée non flexible

1 Domaine d'application

L'article de la Partie 1 est remplacé par le texte suivant.

La présente partie de l'IEC 60335 traite de la sécurité des **matelas ondol** électriques pour usages domestiques et analogues, dont la **tension assignée** est inférieure ou égale à 250 V, y compris les appareils alimentés en courant continu et les **appareils alimentés par batteries**.

La présente norme s'applique également aux **unités de commande** fournies avec l'appareil.

Les appareils non destinés à un usage domestique normal, mais qui peuvent néanmoins constituer une source de danger pour le public, tels que les appareils destinés à être utilisés dans les stations thermales ou par des personnes à des températures ambiantes froides, sont compris dans le domaine d'application de la présente norme.

Dans la mesure du possible, la présente norme traite des dangers ordinaires présentés par les appareils, encourus par tous les individus à l'intérieur et autour de l'habitation. Cependant, elle ne tient en général pas compte

- des personnes (y compris des enfants) dont
 - les capacités physiques, sensorielles ou mentales; ou
 - le manque d'expérience et de connaissanceles empêchent d'utiliser l'appareil en toute sécurité sans surveillance ou instruction;
- des enfants qui jouent avec l'appareil.

La présente norme ne s'applique pas

- aux appareils prévus exclusivement pour des usages industriels;
- aux appareils destinés à être utilisés dans des locaux qui présentent des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz);
- aux couvertures, coussins, vêtements et appareils chauffants souples analogues (IEC 60335-2-17);
- aux appareils de chauffage des locaux (IEC 60335-2-30);
- aux dispositifs de chauffage pour matelas à eau (IEC 60335-2-66);
- aux appareils de chauffage destinés à la reproduction et à l'élevage des animaux (IEC 60335-2-71);
- aux chancelières et carpettes chauffantes (IEC 60335-2-81);
- aux films souples chauffants pour le chauffage des locaux (IEC 60335-2-96);
- aux tapis chauffants et aux unités chauffantes pour le chauffage des locaux, installés sous des revêtements de sol amovibles (IEC 60335-2-106);
- aux appareils spécifiquement destinés à être utilisés sous surveillance médicale (IEC 80601-2-35).

2 Références normatives

L'article de la Partie 1 s'applique, avec l'exception suivante.

Addition:

ISO 2439, *Matériaux polymères alvéolaires souples – Détermination de la dureté (technique par indentation)*

3 Termes et Définitions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 *Modification:*

fonctionnement normal

Remplacer le premier alinéa par ce qui suit:

fonctionnement de l'appareil dans les conditions suivantes:

Le **matelas ondol** est placé sur le plancher du coin d'essai à distance des parois, tous les pieds faisant partie intégrante du **cadre de lit** étant retirés.

Le sommier du **cadre de lit** est remplacé par une plaque en contreplaqué de 20 mm d'épaisseur. Le plancher ondol chauffant est recouvert d'une feuille d'isolant thermique

Note 101 à l'article: La spécification de l'isolant thermique est fournie à l'Annexe AA normative.

3.5 Définitions relatives aux types d'appareils

3.5.101

matelas ondol

appareil constitué d'un plancher ondol chauffant qui comporte un **élément chauffant** intégré qui chauffe le plancher ondol chauffant, et d'un **cadre de lit** qui soutient le plancher ondol chauffant

Note 1 à l'article: Les planchers ondol chauffants sont généralement constitués d'un matériau inorganique comme la pierre ou le loess.

3.5.102

appareil régulé

appareil qui comporte, dans le **matelas ondol**, des moyens de détection des variations de température lorsque l'appareil est mis en **fonctionnement normal**, ce qui permet de réguler automatiquement la puissance absorbée moyenne

3.6 Définitions relatives aux parties d'un appareil

3.6.101

élément chauffant

conducteur chauffant tel qu'une feuille ou des fils chauffants recouverts d'un matériau isolant

3.6.102

unité de commande

appareil intégré dans le **cadre de lit** ou extérieur au **cadre de lit** qui permet de régler ou de réguler la puissance absorbée moyenne de l'appareil

Note 1 à l'article: Les interrupteurs pour câble souple à plusieurs positions ne sont pas considérés comme étant des **unités de commande**, à moins qu'ils comportent des composants de régulation de la puissance absorbée.

3.6.103**cadre de lit**

cadre qui soutient le plancher ondol chauffant

Note 1 à l'article: Le **cadre de lit** peut comporter des pieds qui permettent de ménager un espace entre la face inférieure du plancher ondol chauffant et le sol.

4 Exigences générales

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

L'article de la Partie 1 s'applique, avec l'exception suivante.

5.8.101 Les **appareils régulés** sont alimentés comme cela est spécifié pour les **appareils à moteur**.

6 Classification

L'article de la Partie 1 s'applique.

7 Marquage et instructions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

7.1 Addition:

Les appareils doivent porter les marquages suivants:

- la **puissance assignée**;
- le symbole ISO 7000-0790 (2004-01) ou, en substance, la mention "Lire les instructions";
- le symbole ISO 7000-0434A (2004-01) ou, en substance, "Attention: Ne pas utiliser avec des personnes inexpérimentées, des enfants ou des personnes insensibles à la chaleur".

Les appareils à utiliser avec une **unité de commande amovible** doivent porter un marquage qui fait référence à l'**unité de commande** à utiliser.

Les appareils à utiliser avec un **transformateur amovible** doivent porter un marquage qui fait référence au transformateur à utiliser.

Les **unités de commande amovibles** et les **transformateurs amovibles** doivent porter un marquage qui fait référence aux appareils avec lesquels ils peuvent être utilisés.

7.12 Addition:

Les instructions doivent comporter en substance les indications suivantes:

Instructions importantes. À conserver pour usage ultérieur.

Cet appareil n'est pas destiné à un usage médical dans un hôpital.

Cet appareil ne doit pas être utilisé par des personnes insensibles à la chaleur ou par d'autres personnes très vulnérables, incapables de réagir en cas de surchauffe.