

**INTERNATIONAL
STANDARD**

**IEC
60335-2-53**

Third edition
2002-10

**Household and similar electrical appliances –
Safety –**

**Part 2-53:
Particular requirements for sauna heating
appliances**

*Appareils électrodomestiques et analogues –
Sécurité –*

*Partie 2-53:
Règles particulières pour les appareils de chauffage
de sauna*



Reference number
IEC 60335-2-53:2002(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-53: Particular requirements for sauna heating appliances**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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

This third edition cancels and replaces the second edition published in 1997. It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61/2234/FDIS	61/2308/RVD

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) 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 sauna heating appliances.

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 publication will remain unchanged until 2004. At this date, the publication will be

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

The following differences exist in the countries indicated below.

- 6.1: Class 0I appliances are allowed (Japan).
- 11.2: The temperature rises in front of the sauna heater are not measured (USA).
- 11.8: The temperature rise limits are different (USA).
- 13.2: Leakage current tests are carried out on sauna heaters having a supply cord (USA).
- 16.2: Leakage current tests are carried out on sauna heaters having a supply cord (USA).
- 19.1: The volume of the sauna room is different (USA).
- 19.5: The test is also carried out on appliances intended to be permanently connected to fixed wiring (Norway).
- 19.101: The test is not applicable (USA).
- 22.101: The mass of rocks is different (USA).
- 22.103: The requirement is not applicable (USA).
- 24.102: The 125 °C limit is not applicable (USA).
- 25.7: The supply cords are different (USA).
- Annex AA: The sauna room is different (USA).

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

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

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

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

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

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.

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.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-53: Particular requirements for sauna heating appliances

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric **sauna heating appliances** having a **rated power input** not exceeding 20 kW, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

NOTE 101 **Sauna heating appliances** may be of the thermal storage type.

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

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

NOTE 102 Attention is drawn to the fact that

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

NOTE 103 This standard does not apply to

- 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);
- appliances intended to cause perspiration to only a part of the human body;
- sweating baths where the head of the user remains outside the heated space;
- tents and other collapsible sauna baths.

2 Normative references

This clause of Part 1 is applicable.

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*

normal operation

operation of the appliance under the following conditions

Sauna heating appliances are installed in the sauna room specified in Annex AA and in accordance with the instructions. The volume of the sauna room is the minimum value specified in the instructions.

The rock container is filled in accordance with the instructions. If the capacity of the rock container is adjustable, the container is filled with the most unfavourable quantity of rocks. If the rock container has a lid, the lid is positioned in accordance with the instructions.

Prefabricated saunas are installed in accordance with the instructions.

3.101**sauna heater**

appliance incorporating heating elements having a container filled with appropriate rocks

3.102**sauna heating appliance**

appliance comprising a **sauna heater**, controls, **protective devices** and control board

3.103**prefabricated sauna**

assembly comprising a sauna room and a **sauna heating appliance**

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.

5.2 Addition:

*If the appliance comprises more than one **sauna heater**, these are tested together.*

5.101 *If a ventilating fan operates independently of the heating element, the tests are carried out with or without the fan in operation, whichever is more unfavourable.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Appliances shall be **class I**, **class II** or **class III**.

6.2 Addition:

Sauna heaters, controls and **protective devices** intended to be mounted inside the sauna room shall be at least IPX4.

Electrical components of **prefabricated saunas** shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Sauna heaters shall be marked with the substance of the following:

See instructions for additional important information.

They shall also be marked with

- the minimum distance between the top of the heater and the ceiling of the sauna room;
- the minimum distance between the bottom of the heater and the floor of the sauna room, unless this distance is determined by the construction of the heater;
- the minimum horizontal distance between the heater and any combustible material of the sauna room, including a protective rail, unless these distances are determined by the construction of the heater;
- the maximum depth and minimum width of the recess for **sauna heaters** intended to be installed in a recess.

Sauna heaters shall be marked with the substance of the following:

WARNING: Covering causes fire risk

The inside wall of **prefabricated saunas** shall be marked near the **sauna heater** with the substance of the following:

WARNING: Covering the heater causes fire risk

Sauna heaters shall be marked with the substance of the following:

WARNING: An inadequately filled rock container causes fire risk

NOTE 101 This warning is not required if the **sauna heater** complies with Clause 11 without rocks in the container.

7.7 Addition:

Control boards shall have a connection diagram that gives details of the electrical connections for controls and **protective devices**.

NOTE 101 The connection diagram may also show connections, other than those required, provided the additional information does not cause confusion.

NOTE 102 If more than one control board is provided, the connection diagram may be divided so that each control board has its own connection diagram and a reference to the other control boards.

7.12 Addition:

The instructions for **sauna heaters** shall state how to fill the rock container.

The instructions for appliances for public saunas that do not have a timer shall state that the appliance is to be continuously attended. The instructions for use for other **sauna heating appliances** shall state that the sauna room is to be inspected before restarting the timer.

7.12.1 Addition:

The installation instructions for **prefabricated saunas** shall give details on how to assemble the appliance.

The installation instructions for other appliances shall include the following details:

- the minimum and maximum volume, in cubic metres, of the sauna room in which the **sauna heater** is intended to be installed;
- the minimum height of the sauna room;
- the materials to be used for the walls and the ceiling of the sauna room;
- the arrangement of the separate protective rail, if applicable;
- the means of ventilating the sauna room;

- the installation of adjacent **sauna heaters** or a statement that the **sauna heater** must be used alone;
- the connection and position of controls in the sauna room;
- the installation of the control board, including a statement that the control board must be mounted outside the sauna room;
- the type of cable for supplying of the sauna heater.

The installation instructions for appliances for public saunas that do not have a timer shall state that a pilot lamp showing that the heater is switched on is to be installed in the attendant's room.

7.14 Addition:

The marking of distances to combustible material of the sauna room shall be clearly visible from the outside of the **sauna heater** without removing covers.

The warnings concerning fire risks shall be visible after the **sauna heater** has been installed and the lettering shall have a height of at least

- 5 mm, for headings;
- 3 mm, for other lettering.

NOTE 101 These warnings may be placed on a recessed low part of the **sauna heater**.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 Addition:

*The test is also carried out with the rock container empty unless the **sauna heater** is marked with the warning concerning an inadequately filled rock container.*

11.3 Addition:

*Temperature rises in front of the **sauna heater** are measured on a movable wooden rod placed vertically on the floor. The rod has dimensions approximately 20 mm by 20 mm and has sufficient length to extend at least 400 mm above the highest point of the rocks. The distance between the rod and the heater is the minimum horizontal distance marked on the heater.*

NOTE 101 If it is indicated that the minimum horizontal distance varies with the height from the floor, the measurements are made accordingly.

11.7 Replacement:

Appliances are operated until steady conditions are established.

11.8 Modification:

*The temperature rise of the wooden rod, walls, ceiling and floor of the sauna room or of the **prefabricated sauna** shall not exceed 115 K.*

In the sauna room, the temperature rises of handles, knobs, grips and similar parts that are held for short periods only, are increased by 20 K.

NOTE 101 The ambient temperature is the temperature of the air outside the sauna room.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1 Addition:

*For **sauna heaters** of the thermal storage type, the tests are carried out at the end of the charging period.*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

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 Addition:

The tests of 19.2 to 19.4 are carried out in the sauna room of Annex AA, the volume being the maximum specified in the instructions or the volume shown in Table 101, whichever is greater.

NOTE 101 This is not applicable to prefabricated saunas.

Table 101 – Volume of sauna room

Rated power input of the sauna heater^a kW	Volume of the sauna room m ³
≤ 3,5	5
> 3,5 and ≤ 5	6
> 5 and ≤ 8	10
> 8 and ≤ 10	12
> 10 and ≤ 13	16
> 13 and ≤ 16	20
> 16 and ≤ 20	25

^a For intermediate values of **rated power input**, the volume of the sauna room is determined by interpolation.

19.2 Addition:

If the rock container is detachable or supplied separately, the test is carried out without the container.

The test is carried out with any lid placed in the most unfavourable position.

19.13 Modification:

The temperature rise of the surfaces of walls, ceiling and floor of the sauna room and wooden rod shall not exceed 140 K.

19.101 Sauna heaters shall not emit excessive heat radiation that could damage combustible material of the sauna room.

Compliance is checked by the following test.

The **sauna heater** is installed as specified for **normal operation** but the volume of the sauna room is the maximum specified in the instructions. A quantity of sand is sprinkled through the rock container so that heat-reflecting surfaces are covered as far as possible, before filling the container with rocks. A wooden rod is placed in front of the heater, as specified in 11.3.

The heater is operated at 1,24 times **rated power input**. The door of the room is opened as necessary to maintain the temperature just above 90 °C at a point located 300 mm below the centre of the ceiling. The test is continued until steady conditions are established.

The temperature of the surfaces of walls, ceiling and floor of the sauna room and wooden rod shall not exceed 140 °C.

NOTE 1 Fans are not to be used for evacuating heat from the room.

NOTE 2 Heating elements are replaced if they rupture during the test.

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.2 Addition:

Appliances shall incorporate a switch complying with 24.3.

22.17 Addition:

Heat shields shall be fixed so that it is not possible to remove them without the aid of a **tool**.

22.101 Sauna heaters for wall mounting shall be constructed so that they can be fixed securely to a wall. The fixing means shall have adequate mechanical strength.

NOTE Keyhole slots, hooks and similar means without any further provision to prevent the heater from being inadvertently lifted off the wall are not considered to be adequate means for fixing the heater securely to the wall.

Compliance is checked by inspection and by the following test.

*The **sauna heater** is mounted on a wall in accordance with the instructions, the rock container being filled with the maximum quantity of rocks specified.*

A mass of 100 kg or twice that of the heater including the filled rock container, whichever is greater, is placed on top of the heater for 30 min.

The heater shall remain securely fixed to the wall and the fixing means shall show no appreciable deformation.

22.102 The terminal compartment of the supply for the **sauna heater** shall have a drain hole at least 5 mm in diameter or 20 mm² in area with a width of at least 3 mm.

Compliance is checked by inspection and by measurement.

22.103 Appliances, other than those for installation in public saunas, shall be provided with a timer. For appliances for use in blocks of flats, hotels and similar locations, the operating period of the **sauna heater** shall be limited to 12 h with a minimum rest period of 6 h before any automatic restarting. For other appliances, the operating period of the timer shall be limited to 6 h, automatic restarting not being allowed.

Compliance is checked by inspection.

22.104 Appliances shall be supplied with sufficient rocks to fill the container.

Compliance is checked by inspection.

NOTE This does not apply if the appliance complies with Clause 11 without rocks.

22.105 If **sauna heating appliances** consist of more than one **sauna heater**, they shall be constructed to that the heaters can be installed adjacent to each other and controlled by common controls and **protective devices**.

Compliance is checked by inspection.

22.106 Luminaires inside **prefabricated saunas** shall be controlled independently from the main switch of the appliance.

Compliance is checked by inspection.

22.107 The contacts and sensing elements of **thermostats** and **thermal cut-outs** shall operate independently of each other and shall not control the same contactor.

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.

24.101 Thermal cut-outs shall not be self-resetting and shall disconnect all heating elements of the **sauna heater**.

Compliance is checked by inspection.

24.102 Controls and **protective devices** for mounting inside the sauna room, and luminaires of **prefabricated saunas**, shall be suitable for use at the highest temperature measured during the test of Clause 11 or 125 °C, whichever is higher.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 Modification:

The requirement is only applicable to **prefabricated saunas**.

Appliance inlets are not allowed.

25.7 Modification:

Supply cords shall be polychloroprene sheathed and be not lighter than heavy polychloroprene-sheathed flexible cord (code designation 60245 IEC 66).

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.

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.

Annexes

The annexes of Part 1 are applicable except as follows.

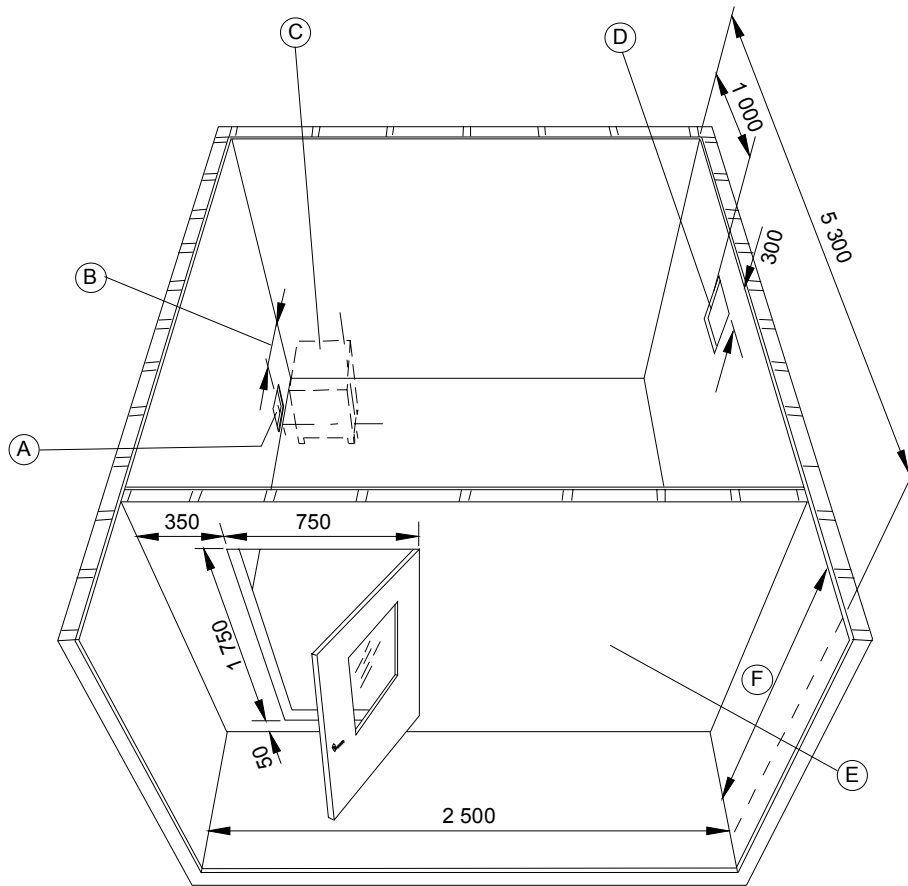
Annex AA (normative)

Sauna room for testing sauna heating appliances

The sauna room is shown in Figure AA.1 and has adjustable dimensions. The ceiling height can be adjusted to 1 900 mm, 2 100 mm or 2 300 mm and depends upon the minimum vertical distance marked on the **sauna heater**. The width is 2 500 mm and the length is adjustable by moving one of the walls. If a smaller sauna room is required, a partition wall having a length of 1 200 mm is installed.

The walls, ceiling and floor of the sauna room are made of plywood approximately 20 mm thick. The walls and the ceiling are insulated using insulation having a thermal resistance of 1,875 m² K/W to 2,5 m² K/W. The floor is installed 30 mm above the supporting surface.

The sauna room is ventilated by air having a temperature of 20 °C ± 5 °C passing through an inlet opening in the fixed wall. The opening is at floor level and has dimensions of 150 mm × 150 mm. The opening can be moved in the horizontal direction so that it is located symmetrically behind the **sauna heater**. An air outlet having approximately the same area is positioned in the opposite wall 300 mm below the ceiling and at least 1 000 mm from the fixed wall. Forced ventilation is used to provide six air changes per hour.



IEC 2718/02

Dimensions in millimetres

Key

- A Air inlet
- B Adjustable distance
- C Sauna heater
- D Air outlet
- E Movable wall
- F 1 900 mm, 2 100 mm or 2 300 mm

Figure AA.1 – Sauna room

Bibliography

The bibliography of Part 1 is applicable.



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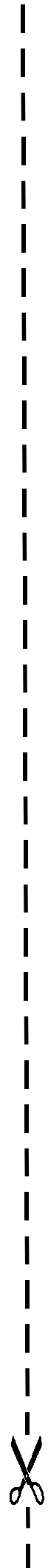
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ISBN 2-8318-6704-5



9 782831 867045

ICS 97.100.10

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND