INTERNATIONAL STANDARD

IEC 60335-2-84

Second edition
2002-11

Household and similar electrical appliances – Safety –

Part 2-84: Particular requirements for toilets

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-84: Règles particulières pour toilettes

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-84: Particular requirements for toilets

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.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
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.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
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 second edition cancels and replaces the first edition published in 1998. It constitutes a technical revision.

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

FDIS	Report on voting
61/2227/FDIS	61/2302/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 toilets.

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.

– 3.1.9: Normal operation is different (USA).

– 6.1: Appliances incorporating water heaters having bare heating elements are not allowed (Greece).

– 6.2: IPX3 heated seats are allowed (Japan).

– 22.103: The test 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 2-84: Particular requirements for toilets

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric toilets in which excrement is stored, dried or destructed, their **rated voltage** being not more than 250 V.

NOTE 101 Electric toilets may be used to process garbage such as paper and food waste.

This standard also applies to electric equipment for use with conventional toilets.

NOTE 102 Examples of such electric equipment are

– automatic seat covering devices;
– chopping units;
– heated seats;
– pumping units;
– water heaters for **shower units**.

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 young children playing with the appliance.

NOTE 103 Attention is drawn to the fact that

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

NOTE 104 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);
– chemical toilets;
– toilets in which excrement is destructed by combustion.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-52, *Environmental testing – Part 2: Test methods – Test Kb: Salt mist, cyclic (sodium chloride solution)*

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*

3.1 normal operation
operation of the appliance under the following conditions

Appliances are operated in cycles, each cycle being initiated every 10 min, bowl covers being open or closed whichever is more unfavourable. If the cycle is not automatically terminated, the appliance is operated for 15 s, or for the period specified in the instructions, whichever is longer.

If warm air is provided for drying, the drying cycle is initiated immediately after the end of the showering cycle, unless the sequence is automatic.

The excrement tank of **mouldering toilets** is empty or filled with peat, whichever is more unfavourable.

Package toilets are provided with bags.

For **freezing toilets**, 0,3 l of water having a temperature of 37 °C is added each cycle, controls being adjusted to the lowest temperature. They are also operated without water.

Shower units are supplied with water at the most unfavourable pressure that provides an effective spray.

3.2 3.101
mouldering toilet
appliance in which excrement is processed by drying

3.3 3.102
package toilet
appliance in which excrement is packed in bags and stored in a tank

3.4 3.103
freezing toilet
appliance in which excrement is frozen and stored in a tank

3.5 3.104
vacuum toilet
appliance in which excrement is evacuated to a storage tank by negative pressure

3.6 3.105
shower unit
device incorporated in the appliance that sprays water for cleaning parts of the human body

NOTE **Shower units** may subsequently supply warm air for drying. The units may be incorporated in the seat or bowl.

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.

5.7 *Addition:*

The temperature of the water used for the tests is 15 °C ± 5 °C.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Appliances incorporating water heaters having bare heating elements shall be **class I** or **class III**.

6.2 *Addition:*

Toilets and heated seats shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.12 *Addition:*

The instructions shall state how to empty and clean the toilet safely. They shall include details about the final disposal of the excrement or its residue, unless the toilet is connected to the sewage system.

7.12.1 *Addition:*

The installation instructions for **class 0I appliances** and **class I appliances** shall state that they have to be earthed.

The installation instructions for appliances incorporating water heaters having bare heating elements shall state the substance of the following:

– the resistivity of the water supply must not be less than …. Ωcm;
– the appliance must be permanently connected to fixed wiring.

The installation instructions shall state

– the maximum permissible inlet water pressure, in megapascals, for appliances intended to be connected to the water mains;
– the minimum permissible inlet water pressure, in megapascals, if this is necessary for the correct operation of the appliance.

The installation instructions shall state that the label concerning glowing cigarettes is to be fixed in a conspicuous place beside the toilet (except flushing toilets).

7.101 Toilets, except flushing toilets, shall be provided with a label stating that glowing cigarettes and other burning materials must not be thrown into the toilet.

The label shall be suitable for permanent fixing.

NOTE The label may be fixed on the appliance if it is visible before using the toilet.

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:*

Test probe 18 of IEC 61032 is also applied, as specified for test probe B.

8.2 *Addition:*

Test probe 18 of IEC 61032 is also applied, as specified for test probe B.

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.

11.3 *Addition:*

Thermocouples attached to the small blackened disks are also used for measuring the temperature rise of warm air.

11.7 *Replacement:*

Shower units *are operated for 2 min unless the water flow stops automatically. Other appliances are operated until steady conditions are established.*

11.8 *Addition:*

The temperature rises shall not exceed the values shown in Table 101.

Table 101 – Maximum normal temperature rises

Part	***Temperature rise*** *K*
Surfaces likely to be in contact with the skin:	
– if of metal	*15*
– if of other material	*25*
Warm air for drying parts of the human body	*40* [a]
Surfaces outside the bowl located within 250 mm of the seat	*30*
Interior of the excrement tank of ***mouldering toilets***	*60*
Ducts through which excrement passes	*60*
[a] *The air temperature is measured 50 mm from the air outlet.*	

The temperature of the water supplied by ***shower units*** *shall not exceed 45 °C.*

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Addition*:

Water heaters having bare heating elements are tested with water having the resistivity stated in the instructions.

NOTE 101 The appropriate resistivity may be obtained by adding ammonium phosphate to the water.

*For water heaters of **class I** having bare heating elements, the leakage current is measured between a metal sieve positioned 10 mm from the spray head of the **shower unit** and the earthing terminal. The terminals of the heating element are connected through the selector switch to each pole of the supply in turn, as shown in Figure 101.*

The leakage current shall not exceed 0,25 mA.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 *Addition:*

It may be necessary to use the spray nozzle described in subclause 14.2.4(b) of IEC 60529 for testing the inside of the bowl.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Addition:*

Water heaters having bare heating elements are tested with water having the resistivity stated in the instructions.

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:*

Appliances incorporating automatic controls are also subjected to the test of 19.101.

19.2 *Addition:*

Water heaters are tested with or without water, whichever is more unfavourable.

19.13 *Addition:*

The temperature rises shall not exceed the values shown in Table 102.

Table 102 – Maximum abnormal temperature rises

Part	***Temperature rise*** *K*
Surfaces likely to be in contact with the skin:	
– if of metal	*25*
– if of other material	*55*
Warm air for drying parts of the human body	*65* [a]
Surfaces outside the bowl located within 250 mm of the seat	*40*
Interior of the excrement tank of ***mouldering toilets***	*100*
Ducts through which excrement passes	*100*
[a] *The air temperature is measured 50 mm from the air outlet.*	

The temperature of the water supplied by ***shower units*** *shall not exceed 65 °C.*

19.101 *The appliance is supplied at* ***rated voltage*** *and operated under* ***normal operation****. Any fault conditions that can be expected in normal use are applied one at a time.*

NOTE Examples of fault conditions are

– failure of **thermostats**;
– failure of relays;
– open-circuiting or short-circuiting of components;
– stopping programmers in any position.

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

Addition:

Compliance is also checked by the tests of 21.101 and 21.102.

21.101 *The appliance is subjected to an evenly distributed force of 1 500 N applied perpendicularly to the seat, the bowl cover being open, for 10 min.*

The test is repeated with the bowl cover closed.

A force of 250 N is then applied to the front edge of the bowl cover or seat in a direction parallel to the hinges, the bowl cover or seat being slowly raised and lowered. The test is carried out five times.

The bowl cover or seat is then raised and the force of 250 N is applied for 1 min to its front edge in a direction perpendicular to its plane.

The appliance shall not be damaged to such an extent that compliance with 8.1, 15.1, 16.3 and 27.5 is impaired.

21.102 *The excrement tank is completely filled with water and the appliance placed in a room having a temperature of approximately –15 °C. When the water is completely frozen, the appliance is allowed to warm up until the ice has melted. The test is carried out three times.*

The appliance shall not be damaged to such an extent that compliance with 8.1, 15.1, 16.3 and 27.5 is impaired.

22 Construction

This clause of Part 1 is applicable except as follows.

22.2 *Modification:*

Class I appliances shall not incorporate an appliance inlet.

22.24 *Replacement:*

Appliances shall not incorporate bare heating elements located in excrement tanks.

Compliance is checked by inspection.

22.33 *Modification:*

*Liquids may be in direct contact with **live parts** of bare heating elements and may be heated using electrodes.*

22.101 Toilets shall be **fixed appliances**.

Compliance is checked by inspection.

22.102 Metal parts in contact with the skin and which support the body in normal use shall not be earthed.

Compliance is checked by inspection.

22.103 Appliances shall be constructed so that **live parts** are protected from exposure to excrement.

Compliance is checked by inspection and, if rubber seals are used, by the following test.

The seal is immersed for 24 h in mineral oil having a temperature of 100 °C ± 2 °C. After the test, the volume of the seal shall not have increased by more than 50 %.

NOTE The oil has the following properties:

– aniline point 93 °C ± 3 °C;
– viscosity (20 ± 1) cSt at 100 °C;
– flash point 245 °C ± 6 °C.

22.104 Vacuum toilets shall be constructed so that they cannot be flushed unless the bowl cover is closed.

Compliance is checked by manual test.

22.105 Appliances shall withstand the water pressure expected in normal use.

Compliance is checked by connecting the appliance to a water supply having a pressure equal to twice the maximum permissible inlet water pressure or 1,2 MPa, whichever is higher, for a period of 5 min.

There shall be no leakage.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Modification:*

For heated seats, the number of flexings is 50 000.

23.5 *Addition:*

Internal wiring supplying parts in the excrement tank at **safety extra-low voltage** shall not be lighter than ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53).

24 Components

This clause of Part 1 is applicable except as follows.

24.101 Thermal cut-outs incorporated in appliances for compliance with 19.4 or 19.101 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.

25.3 *Addition:*

Appliances incorporating water heaters having bare heating elements shall only be provided with means for connection to fixed wiring.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable except as follows.

27.1 *Addition:*

For **class I appliances** incorporating water heaters having bare heating elements, the water shall enter and leave through metal pipes that are permanently and reliably connected to the earthing terminal or flow over metal parts that are similarly earthed.

NOTE 101 Examples of such metal parts are grids or rings.

NOTE 102 Parts that are liable to be in contact with excrement are considered to be accessible.

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 except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable.

30.2.3.1 *Modification:*

The specified glow-wire flammability index is not applicable to water heaters having bare heating elements.

30.2.3.2 *Modification:*

For water heaters having bare heating elements, the glow-wire test is carried out as specified for other connections.

30.101 The bowl shall not incorporate combustible material.

Compliance is checked by subjecting non-metallic material to the needle-flame test of Annex E.

The test is not carried out if the material is classified as V-0 according to IEC 60695-11-10, provided that the test sample was no thicker than the relevant part.

31 Resistance to rusting

This clause of Part 1 is applicable except as follows.

Addition:

Compliance is checked by the salt mist test of IEC 60068-2-52, severity 2 being applicable.

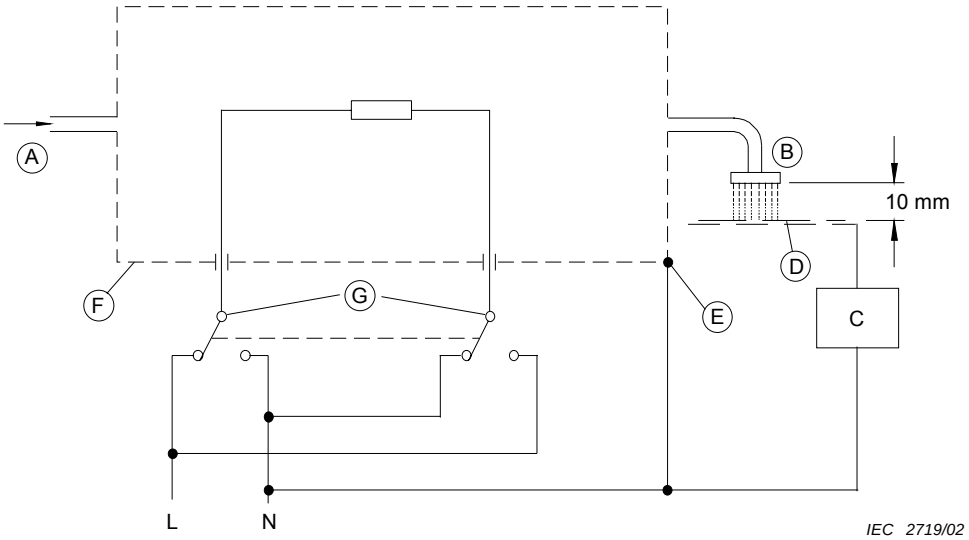
Before the test, coatings are scratched by means of a hardened steel pin, the end of which has the form of a cone with an angle of 40°. Its tip is rounded with a radius of 0,25 mm ± 0,02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0,5 N. The scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the appliance shall not have deteriorated to such an extent that compliance with this standard, in particular with Clauses 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the metal surface.

NOTE 101 It has to be ensured that metal parts in contact with excrement are exposed to the salt mist.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A Inlet pipe
B Spray head
C Circuit of Figure 4 of IEC 60990
D Metal sieve
E Earthing terminal
F Body of the water heater
G Selector switch

Figure 101 – Diagram for leakage current measurement for water heaters having bare heating elements

Annexes

The annexes of Part 1 are applicable.

Bibliography

The bibliography of Part 1 is applicable.

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