

มาตรฐานผลิตภัณฑ์อุตสาหกรรม ความปลอดภัยของเครื่องใช้ไฟฟ้าสำหรับใช้ใน ที่อยู่อาศัยและเครื่องใช้ไฟฟ้าอื่นที่คล้ายกัน เล่ม 2(84) ข้อกำหนดเฉพาะสำหรับส้วมไฟฟ้า

บททั่วไป

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้กำหนดขึ้นโดยรับ IEC 60335-2-84 Edition 3.0 (2019-10) Household and similar electrical appliances - Safety - Part 2-84: Particular requirements for toilet appliances มาใช้โดยวิธีพิมพ์ซ้ำ (reprint) ในระดับเหมือนกันทุกประการ (identical) โดยใช้ IEC ฉบับภาษาอังกฤษเป็นหลัก

1 ขอบข่าย

ให้เป็นไปตามที่กำหนดใน IEC 60335-1 Household and similar electrical appliances - Safety - Part 1: General requirements ข้อ 1 โดยแทนข้อความดังนี้

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้เกี่ยวกับความปลอดภัยของส้วมไฟฟ้า มีแรงดันไฟฟ้าที่กำหนดไม่เกิน 250 V ที่ซึ่งเก็บท่าแห้ง หรือทำลายของเสียจากร่างกาย หรือที่ซึ่งทำแห้งหรือชำระล้างอวัยวะ

หมายเหตุ 101 ตัวอย่างส้วมไฟฟ้ามีดังนี้และสามารถใช้ในการแปรงฟัน เช่น กระดาษและเศษอาหาร

- ส้วมท่าแห้ง (mouldering toilet)
- ส้วมเก็บบรรจุ (package toilet)
- ส้วมแช่แข็ง (freezing toilet)
- ส้วมสุญญากาศ (vacuum toilet)

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ยังใช้กับบริเวณไฟฟ้าสำหรับใช้กับส้วมธรรมดาด้วย

หมายเหตุ 102 ตัวอย่างของบริเวณไฟฟ้าเช่นนี้ได้แก่

- อุปกรณ์ปิดคลุมที่นั่งอัตโนมัติ (automatic seat covering device)
- หน่วยตัดสับ (chopping unit)
- ที่นั่งร้อน (heated seat)
- หน่วยสูบ (pumping unit)
- ตัวทำน้ำร้อนสำหรับที่นั่งพ่นน้ำ (water heaters for spray seat)
- ที่นั่งพ่นน้ำ (spray seat)

ตราบเท่าที่ปฏิบัติได้ มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้เกี่ยวกับอันตรายสามัญ (common hazard) ที่เกิดจากเครื่องใช้ไฟฟ้าซึ่งทุกคนเผชิญอยู่ทั้งในและรอบ ๆ บ้าน อย่างไรก็ตาม โดยทั่วไป มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ไม่คำนึงถึงเด็กเล่นเครื่องใช้ไฟฟ้า

มอก. 60335 เล่ม 2(84)-2566

IEC 60335-2-84:2019

หมายเหตุ 103 คำนึงถึงความจริงที่ว่า

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- ในหลายประเทศ มีข้อกำหนดเพิ่มเติมโดยกระทรวงสาธารณสุข กระทรวงแรงงาน การประปา และองค์กรสาธารณูปโภคที่คล้ายกัน

หมายเหตุ 104 มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ไม่ใช้กับ

- เครื่องใช้ไฟฟ้าที่มีเจตนาให้ใช้ในสถานที่ที่มีภาวะพิเศษ เช่น บรรยากาศมีการกักกรองหรือการระเบิด (ฝุ่น ไอระเหย หรือก๊าซ)
- ส่วนทางเคมี
- ส่วนซึ่งทำลายของเสียจากร่างกายโดยการสันดาป

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รายละเอียดให้เป็นไปตาม IEC 60335-2-84:2019 บรรณานุกรม

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ใช้สำหรับการรับฟังความคิดเห็นเท่านั้น

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-84: Particular requirements for toilet appliances

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
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- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights. International Standard IEC 60335-2-84 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 2002, Amendment 1:2008 and Amendment 2:2013. This edition constitutes a technical revision.

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

- definitions have been renumbered (Clause 3);
- requirements for installation instructions have been updated to reflect the option in 7.101 of the label being placed on the appliance (7.12.1);
- some notes have been converted to normative text (7.101, 22.103, 27.1, 31);
- requirements have been added for appliances that have programmable electronic circuits that limit the number of heating elements and motors from being energized at the same time (22.105, Annex R).

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

CDV	Report on voting
61/5749/CDV	61/5846B/RVC

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for toilet 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 the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

- 3.1.9: Normal operation is different (USA);
- 6.2: Toilets, spray seats and heated seats are allowed to be IPX3 (Japan);
- 22.103: The test is different (USA).

INTRODUCTION

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

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

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

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

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-84: Particular requirements for toilet appliances

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric toilet appliances having a rated voltage being not more than 250 V, in which excrement is stored, dried or destructed or which wash or dry parts of the human body.

NOTE 101 Examples of such electric toilets are the following and they can be used to process garbage such as paper and food waste.

- **mouldering toilets;**
- **package toilets;**
- **freezing toilets;**
- **vacuum toilets.**

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 **spray seats;**
- spray seats.

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 can 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 60068-2-52:1996¹, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

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:

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.

For **spray seats**, if the cycle is not automatically terminated, the appliance is operated for 30 s. If the cycle is automatically terminated, the appliance is operated for 30 s or automatic operation time, whichever is shorter.

If warm air is provided for drying and if the cycle is not automatically terminated, the appliance is operated for 1 min. If the cycle is automatically terminated, the appliance is operated for 1 min or automatically terminating time, whichever is shorter.

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.

Spray seats are supplied with water at the most unfavourable pressure that provides an effective spray

3.5 Definitions relating to types of appliances

3.5.101

mouldering toilet

appliance in which excrement is processed by drying

3.5.102

package toilet

appliance in which excrement is packed in bags and stored in a tank

¹ This 2nd edition was replaced in 2017 by a 3rd Edition IEC 60068-2-52:2017, *Environmental testing – Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)* but the listed edition applies.

3.5.103

freezing toilet

appliance in which excrement is frozen and stored in a tank

3.5.104

vacuum toilet

appliance in which excrement is evacuated to a storage tank by negative pressure

3.5.105

spray seat

appliance that sprays water for cleaning parts of the human body

Note 1 to entry: **Spray seats** can have functions such as heating the seat, drying, deodorizing or automatically opening/closing the seat and the bowl cover.

Note 2 to entry: **Spray seats** can be integrated with a toilet.

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:

The tests of 31.101 are not carried out on a separate appliance.

5.3 Addition:

The tests of 31.101 are carried out before the test of Clause 8.

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**.

Spray seats shall be **class I**, **class II**, or **class III**.

6.2 Addition:

Toilets, **spray seats** 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.

Modification:

The instructions concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge and children playing with the appliance are not applicable.

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 for toilets, except for flushing toilets, shall state that the label concerning glowing cigarettes is to be fixed in a conspicuous place beside or on the toilet.

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.

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:

Spray seats 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	23
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 **spray seats** 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 can 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 **spray seat** 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 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

<i>Part</i>	<i>Temperature rise K</i>
<i>Surfaces likely to be in contact with the skin:</i>	
– if of metal	36
– if of other material	55
<i>Warm air for drying parts of the human body</i>	65 ^a
<i>Surfaces outside the bowl located within 250 mm of the seat</i>	40
<i>Interior of the excrement tank of mouldering toilets</i>	100
<i>Ducts through which excrement passes</i>	100
^a The air temperature is measured 50 mm from the air outlet.	

The temperature of the water supplied by **spray seats** 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.

21.1 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 150 N is then applied for 5 s to the front edge of the bowl cover or seat in a right or left direction parallel to the hinges, whichever is more unfavourable. Then the bowl cover or seat is slowly raised and lowered. The test is carried out five times.

The bowl cover or seat is then raised and the force of 150 N is applied for 1 min to its front edge in a direction perpendicular to its plane. For **spray seats** and heated seats that are installed onto the toilet bowl or integrated with the toilet bowl, the force of 150 N is applied, and the bowl cover is lifted to less than an angle of 120°. If detachable parts are removed, no more force is applied.

The appliance shall not be damaged to such an extent that compliance with 8.1, 15.1, 16.3, 27.5 and Clause 29 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.

21.103 **Spray seats**, heated seats, enclosures and seats shall have adequate mechanical strength and be constructed to withstand repeated mechanical stresses that may be expected to occur during normal use.

Compliance is checked by the tests of 21.103.1 and 21.103.2.

21.103.1 *The appliance is subjected to an evenly distributed force of 1 250 N applied perpendicularly to the seat for 4 s by a rubber disc having a thickness of 10 mm, a diameter of 300 mm and a shore A hardness of 70° , with a steel disc having a thickness of 5 mm and a diameter of 300 mm attached on its upper surface. The test is carried out 20 000 times.*

The appliance shall not be damaged to such an extent that compliance with 8.1, 15.1, 16.3, 27.5 and Clause 29 is impaired.

21.103.2 *The appliance is subjected to an evenly distributed force of 890 N applied perpendicularly on each side of the seat for 1 s with a 0,5 s interval by a rubber disc having a thickness of 19 mm, a diameter of 76 mm and a shore A hardness of 70° . The test is carried out 10 000 cycles. One cycle consists of applying the force to one side and the other.*

The appliance shall not be damaged to such an extent that compliance with 8.1, 15.1, 16.3, 27.5 and Clause 29 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 or as water heaters for **spray seats**.

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.

22.48 Addition:

If a dynamic backflow preventer is used, the critical level shall be located not less than 25 mm above the fixture rim flood level.

22.101 Toilets shall be **fixed appliances**.

Compliance is checked by inspection.

22.102 Metal parts in contact with skin and which support the body in normal use shall be of **class II construction**.

This requirement does not apply if the metal parts in contact with skin and which support the body in normal use are earthed and permanently connected to the fixed wiring.

Compliance is checked by inspection and, if necessary, by the relevant tests.

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 $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$. After the test, the volume of the seal shall not have increased by more than 50 %.

The oil shall have the following properties:

- *aniline point, $93^{\circ}\text{C} \pm 3^{\circ}\text{C}$;*
- *viscosity, (20 ± 1) cSt at 100°C ;*
- *flash point, $245^{\circ}\text{C} \pm 6^{\circ}\text{C}$.*

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 For appliances that are controlled by **programmable electronic circuits** that limit the number of heating elements and motors from being energized at the same time, simultaneous activation of any combination of heating elements and motors shall not render the appliance unsafe.

Compliance is checked as follows:

- *the fault/error conditions specified in Table R.1 are applied and evaluated in accordance with the relevant requirements of Annex R; or*
- *the appliance is operated under the conditions of Clause 11 while being supplied at **rated voltage**, the **programmable electronic circuits** being modified to allow simultaneous activation of all heaters and motors under their control.*

Under these conditions, compliance with 19.13 shall be fulfilled.

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. This requirement is not applicable to **spray seats** when a thermal link for compliance with 19.13 is connected in series with a **thermal cut-out** with an operating temperature not exceeding 65 °C, in 19.13.

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.

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

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

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.

During the test, metal parts that may be contacted by excrement shall be exposed to the salt mist.

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.

31.101 Toilet appliances shall have adequate resistance to cleaners and urine.

Compliance is checked by the following tests.

The following tests are separately applied to appliances unless electrical parts are enclosed or located so that they are unlikely to be exposed to the pollution atmosphere.

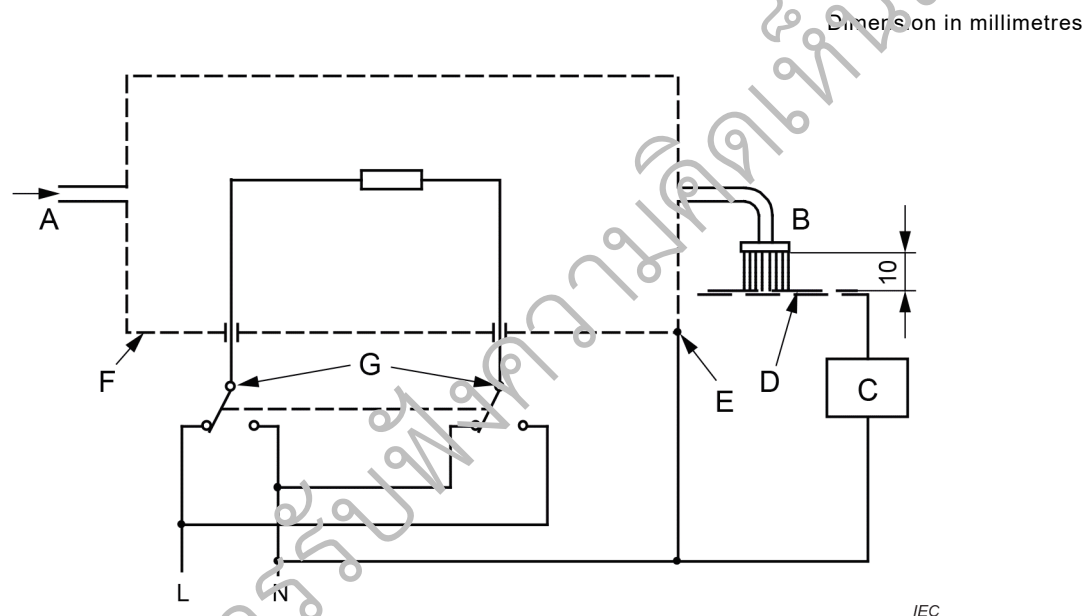
The appliance is kept for 96 h in a $0,055 \% \pm 0,005 \%$ intensity by volume ammoniac atmosphere at room pressure.

The appliance is then kept for 96 h in a $0,000 5 \% \pm 0,000 2 \%$ intensity by volume hydrochloric acid atmosphere at room pressure.

The appliance shall show no damage that could impair compliance with this standard.

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 60990:1999
- 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, except as follows.

Annex R (normative)

Software evaluation

R.2.2.5 *Modification:*

For programmable **electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1, detection or a fault/error shall occur before compliance with Clause 19 and 22.105 is impaired.

R.2.2.9 *Modification:*

The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19 and 22.105 is impaired.

Bibliography

The bibliography of Part 1 is applicable.
