IEC 60335-2-101

Edition 2.0 2024-10
COMMENTED VERSION

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-101: Particular requirements for vaporizers

IEC 60335-2-101:2024-10 CMV(en)

Documents
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ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-101: Particular requirements for vaporizers

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 commented version (CMV) of the official standard IEC 60335-2-101:2024 edition 2.0 allows the user to identify the changes made to the previous IEC 60335-2-101:2002+AMD1:2008+AMD2:2014 CSV edition 1.2. Furthermore, comments from IEC TC 61 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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IEC 60335-2-101 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 2002, Amendment 1:2008 and Amendment 2:2014. 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, 7.1);

c) application of test probe 19 has been introduced (8.1.1, 8.1.3, 20.2, B.22.3, B.22.4);

d) addition of external accessible surface temperatures (Clause 11).

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

Draft	Report on voting
61/7278/FDIS	61/7302/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: Particular requirements for vaporizers.

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.

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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.~~ 1

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. 2

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-101: Particular requirements for vaporizers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric **vaporizers** for household and similar use, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**. 3

~~NOTE 101~~ Examples of appliances that are within the scope of this standard are:

– air fresheners;
– insect repellers.

They ~~may~~ can be plugged directly into a socket-outlet or connected to the supply mains by means of a flexible cord and plug.

Appliances not intended for normal household use but which nevertheless ~~may~~ can be a source of danger to the public, such as appliances intended to be used by ~~laymen~~ laypersons in shops, in light industry and on farms, 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 knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

~~NOTE 102~~ Attention is drawn to the fact that

– for appliances to be used in vehicles or on board ships or aircraft, additional requirements ~~may~~ can 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 exclusively for industrial purposes;
– appliances intended to be used in locations where special conditions prevail, such as the presence of corrosive or explosive atmosphere (dust, vapour or gas);
– appliances for heating liquids (IEC 60335-2-15);
– insect killers (IEC 60335-2-59);
– fabric steamers (IEC 60335-2-85);
– humidifiers (IEC 60335-2-98).

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2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

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:* **4**
normal operation

Replace the first paragraph with the following:

operation of the appliance filled with vaporizing medium in accordance with the instructions, or unfilled, whichever is more unfavourable

3.5 Definitions relating to types of appliances

3.5.101
vaporizer
appliance incorporating a heater for vaporizing a medium in order to affect the air in a room

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 test of 21.101 is carried out on a new appliance.

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:*

~~NOTE 101~~ If the **rated power input** does not exceed 10 W, the appliance may be marked "10 W max".

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7.12 *Addition:*

The instructions shall include the substance of the following:

The appliance is only to be used with the recommended vaporizing medium. The use of other substances ~~may~~ can give rise to a toxic or fire risk.

For appliances that are directly plugged into socket-outlets, if the temperature rise of **accessible surfaces** during the test of Clause 11 exceeds the value specified for handles, knobs, grips and similar parts that are held for short periods only in normal use, the instructions shall include the substance of the following:

The appliance has hot surfaces to evaporate the active ingredients and these surfaces should not be touched during use.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition*:

For parts of appliances with pins for insertion into the socket outlet and other appliances situated not more than 850 mm above the floor after installation or in normal use, 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. **5**

8.1.3 *Addition:*

Test probe 19 is not applied.

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 except as follows.

10.1 *Addition:*

For appliances marked with "10 W max", the power input shall not exceed this value.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 *Addition:*

Where the external ***accessible surfaces*** *are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external* ***accessible surfaces*** *specified in Table 101. The probe is applied with a force of 4 N ± 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

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The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used. **6**

11.4 *Modification:*

Instead of operating the appliance at 1,15 times ***rated power input****, it is supplied at 1,06 times* ***rated voltage****.*

11.7 ~~*Replacement*~~ *Modification:* **7**

Replace the first paragraph with the following:

The appliance is operated until steady conditions are established.

11.8 *Modification:*

~~*In Table 3, the temperature rise of Parts in contact with oil is not measured.*~~

Replace the first paragraph with the following:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101. **8**

In Table 3, delete the entry for Parts in contact with oil having a flash-point of t °C.

Add the following to footnote "k" of Table 3:

Similar parts held for short periods include handles or grips of vents and air shutters.

Addition:

For appliances that are directly plugged into socket-outlets, the temperature rise of ***accessible surfaces*** *shall not exceed the limit specified for handles, knobs, grips and similar parts that are held for short periods only in normal use. This does not apply to surfaces of outlet grilles and slots for inserting the vaporizing medium, and surfaces within 7 mm of these parts.*

The temperature rise of the surface of the appliance adjacent to the socket-outlet shall not exceed 40 K.

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Table 101 – Maximum temperature rises for specified external accessible surfaces under normal operating conditions

Surface	*Temperature rise of external accessible surfaces* [a] *K*	
	Surfaces of appliances situated more than 850 mm above the floor after installation or in normal use according to the installation instructions after installation	*Surfaces of other appliances*
Bare metal	*42*	*38*
Coated metal [b]	*49*	*42*
Glass and ceramic	*56*	*51*
Plastic and plastic coating > 0,4 mm [c, d]	*62*	*58*
NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.		

[a] *The limits do not apply to:*

– *appliances that are directly plugged into socket-outlets;*

– *surfaces of outlet grilles and slots for inserting the vaporizing medium, and surfaces within 7 mm of these parts.*

[b] *Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.*

[c] *The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.*

[d] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*

12 ~~Void~~ Charging of metal-ion batteries

This clause of Part 1 is applicable. 9

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1 *Modification:*

Instead of operating the appliance at 1,15 times ***rated power input****, it is supplied at 1,06 times* ***rated voltage****.*

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.

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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 are also subjected to the test of 19.101.

19.2 *Addition:*

The appliance is operated without the vaporizing medium.

Modification:

Instead of operating the appliance at 0,85 times ***rated power input****, it is supplied at 0,9 times* ***rated voltage****.*

19.3 *Modification:*

Instead of operating the appliance at 1,24 times ***rated power input****, it is supplied at 1,1 times* ***rated voltage****.*

19.4 *Modification:*

Instead of operating the appliance at 1,15 times ***rated power input****, it is supplied at 1,06 times* ***rated voltage****.*

19.13 *Addition:*

During the tests, the temperature rise of ***accessible surfaces*** *of appliances that are directly plugged into socket-outlets shall not exceed*

- *55 K, if of metal;*
- *65 K, if of porcelain or vitreous enamel;*
- *75 K, if of moulded material, rubber or wood.*

This does not apply to surfaces of outlet grilles and slots for inserting the vaporizing medium, and surfaces within 7 mm of these parts.

The temperature rise of the surface of the appliance adjacent to the socket-outlet shall not exceed 65 K.

19.101 *A single layer of double-hemmed pre-washed cotton sheet approximately 70 cm × 70 cm, having a specific mass between 140 g/m^2 and 170 g/m^2 when dry, is draped over the appliance. It is operated under* ***normal operation*** *at* ***rated voltage****.*

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The cotton sheet shall not smoulder or ignite.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 *Addition:*

For parts of appliances with pins for insertion into the socket outlet and other appliances situated not more than 850 mm above the floor after installation or in normal use, 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. **10**

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

NOTE 101 Appliances that are directly plugged into socket-outlets are tested with the appliance rigidly held by its contact pins.

~~*Appliances that are directly plugged into socket-outlets are also subjected to the test of 21.101 which is carried out on a new appliance.*~~

~~**21.101** *An empty appliance is subjected to the test free-fall repeated – procedure 2, of IEC 60068-2-31. The number of falls is*~~

~~*– 50, if the mass of the appliance is greater than 250 g;*~~

~~*– 100, for other appliances.*~~

~~*The height of the fall is 500 mm.*~~

~~*After the test, the appliance shall not be damaged to such an extent that compliance with Clauses 8 and 29 is impaired.*~~ **11**

22 Construction

This clause of Part 1 is applicable except as follows.

22.4 Not applicable.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Addition:*

Appliances that are directly plugged into socket-outlets and can be rotated in relation to the socket-outlet, are subjected to the following test.

The movable part is rotated clockwise and anticlockwise through the largest angle permitted by the construction. It is rotated 100 times at a speed of approximately 10 rotations per min.

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NOTE 101 A rotation is one movement, either clockwise or anticlockwise.

After the test, the appliance shall comply with Clause 8 and Clause 29 and the electrical connections shall not have loosened.

24 Components

This clause of Part 1 is applicable.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.5 *Addition:*

Type Z attachment is allowed.

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 except as follows.

Addition:

NOTE 101 The toxicity of vaporizing materials is controlled by national legislation.

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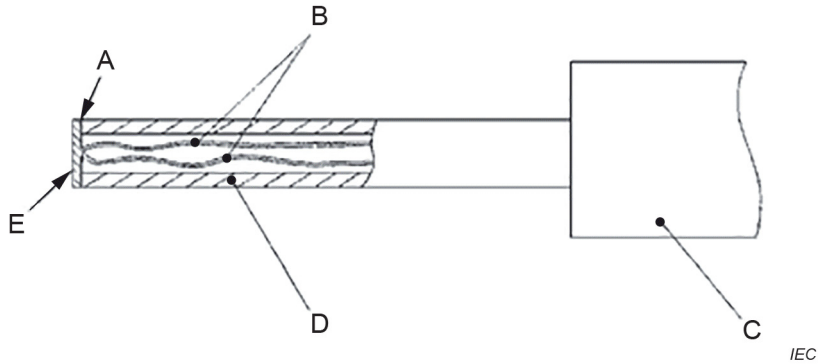

Key

A adhesive

B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

C handle arrangement permitting a contact force of 4 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with flat contact face

Figure 101 – Probe for measuring surface temperatures

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Annexes

The annexes of Part 1 are applicable except as follows.

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