

INTERNATIONAL STANDARD



Household and similar electrical appliances – Safety –
Part 2-25: Particular requirements for microwave ovens, including combination
microwave ovens

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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-25: Particular requirements for microwave ovens, including combination microwave ovens

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-25:2020. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60335-2-25 has been prepared by subcommittee 61B: Safety of microwave appliances for household and commercial use, of IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This eighth edition cancels and replaces the seventh edition published in 2020. This edition constitutes a technical revision.

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

- a) some subclauses have been modified for the appliance outlets and socket-outlets;
- b) Subclause 7.12 has been improved in clarity;
- c) Subclauses 8.1.1 and 20.2 have been modified to adopt test probe 19;
- d) Subclauses 10.1 and 10.2 have been improved in clarity for inverter type microwave ovens;
- e) maximum temperature rises of external accessible surfaces have been added in Subclause 11.8;
- f) test criterion has been modified in Subclause 15.101;
- g) Subclause 15.102 has been modified for harmonization with IEC 60335-2-6;
- h) Subclauses 8.1.3, 15.103, 19.11.2, 19.13, 22.105, 22.106, 22.111 and Figure 101 have been improved in clarity;
- i) Subclauses 22.103.2, 22.105 and 22.120 have been modified to adopt test probe 18;
- j) Subclause 16.101 has been modified to move the content of 16.101.1, 16.101.2 directly under 16.101;
- k) Subclause 22.119 has been modified to move the content of 22.119.1, 22.119.2 and 22.119.3 directly under 22.119.

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

Draft IEC 60335-2-25	Report on voting
61B/701/FDIS	61B/705/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/standardsdev/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 microwave ovens, including combination microwave ovens.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in **bold**.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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

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

The following differences exist in the countries indicated below.

- 5.3: Microwave leakage is not to exceed 10 W/m² during the initial test (Japan and USA).
- 6.1: Microwave ovens may be class 0I if the rated voltage does not exceed more than 150 V (Japan).
- 7.12: Specific instructions exist pertaining to using and servicing **microwave ovens** with respect to the risk of exposure to microwave energy (USA).
- 7.12: It is prohibited to place the appliance in a cabinet with a door (Japan).
- Clause 18: The test is carried out on two appliances (USA).
- 19.11.2: The input voltage variation is not applied (USA).
- 19.13: Microwave leakage is measured only at the end of each test (USA).
- 21.102: The applied force is 222 N (USA).
- 21.105: Microwave leakage is not to exceed 50 W/m² (Japan and USA).
- 22.111: Microwave leakage is measured only at the end of the test (USA).
- 22.112: Microwave leakage is not to exceed 50 W/m² (Japan and USA).
- 22.115: All access to the cavity has to be prevented (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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 and SC 61B supporting documents on the IEC website

<https://www.iec.ch/tc61/supportingdocuments>
<https://www.iec.ch/sc61b/supportingdocuments>

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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

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

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

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

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

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

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

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features which 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~~ can be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-25: Particular requirements for microwave ovens, including combination microwave ovens

1 Scope

This clause of Part 1 is replaced by the following.

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

This standard also deals with **combination microwave ovens**, for which normative Annex AA is applicable.

This standard also deals with **microwave ovens** intended to be used on board ships, for which normative Annex BB is applicable.

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 in shops, in light industry and on farms, are within the scope of this standard. However, if the appliance is intended to be used professionally to process food for commercial purposes, the appliance is not considered to be for household and similar use only.

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

- persons (including children) whose
 - physical, sensory or mental capabilities; or
 - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

NOTE 101—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 and similar authorities.

NOTE 102—This standard does not apply to

- commercial **microwave ovens** (IEC 60335-2-90);
- commercial microwave appliances with insertion or contacting applicators (IEC 60335-2-110);
- industrial microwave heating equipment (IEC 60519-6);
- appliances for medical purposes (IEC 60601);
- 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).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60068-2-6, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

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

~~IEC 60335-2-5:2012, Household and similar electrical appliances – Safety – Part 2-5: Particular requirements for dishwashers~~

IEC 60335-2-6:2014¹, *Household and similar electrical appliances – Safety – Part 2-6: Particular requirements for stationary cooking ranges, hobs, ovens and similar appliances*

IEC 60335-2-9, *Household and similar electrical appliances – Safety – Part 2-9: Particular requirements for grills, toasters and similar portable cooking appliances*

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

<https://standards.iteh.ai/catalog/standards/iec/dd9d4ae1-738f-48d2-ab8e-f27e850484a7/iec-60335-2-25-2024> **3.1.7** *Addition:*

Note 101 to entry: The **rated frequency** is the input frequency.

3.1.9 normal operation

Modification:

Replace the first paragraph by the following:

operation of the appliance with $1\,000\text{ g} \pm 50\text{ g}$ of potable water at an initial temperature of $20\text{ °C} \pm 2\text{ °C}$ in a cylindrical borosilicate glass vessel having a maximum thickness of 3 mm and an outside diameter of approximately 190 mm, the vessel ~~is~~ being placed on the centre of the **shelf**

3.5 Definitions relating to types of appliances

3.5.101 microwave oven

appliance using electromagnetic energy in one or several of the ISM frequency bands² between 300 MHz and 30 GHz, for heating food and beverages in a **cavity**

¹ Under preparation. Stage at the time of publication: IEC/FDIS 60335-2-6:2024.

² ~~ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR 11.~~

Note 1 to entry: ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR 11.

3.5.102

combination microwave oven

microwave oven in which heat is also provided in the **cavity** by simultaneous or consecutive operation of resistive heating elements

Note 1 to entry: The resistive heating elements are used to provide radiant heat, convection heat or steam.

3.6 Definitions relating to parts of an appliance

~~3.103~~ 3.6.101

cavity

space enclosed by the inner walls and the door in which the load is placed

~~3.104~~ 3.6.102

shelf

horizontal support in the **cavity** on which the load is placed

~~3.105~~ 3.6.103

door interlock

device or system that prevents the operation of the ~~magnetron~~ microwave generator(s), unless the oven door is closed

~~3.106~~ 3.6.104

monitored door interlock

door interlock system that incorporates a supervision device

~~3.107~~ 3.6.105

temperature-sensing probe

device that is inserted into the food to measure its temperature and is a part of an oven control

3.8 Definitions relating to miscellaneous matters

3.8.101

open deck

area that is exposed to marine environment

3.8.102

dayroom

area that can be exposed to marine environment from time to time

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:

~~NOTE 101~~—An additional sample can be required for the test of 19.104.

~~NOTE 102~~—Six samples of the interlocks are required for the test of 24.1.4.

5.3 Modification:

Instead of carrying out the tests in the order of clauses, the following sequence of clauses and subclauses applies: 32.1, 22.113, 22.108, 22.115, 22.116, Clause 7 to 17, Clause 20, Clause 21 (except 21.101 to 21.105), Clause 18, Clause 19 (except 19.104), Clause 22 (except 22.108, 22.113, 22.115 and 22.116), Clause 23 to 31 and 32.2, 21.101 to 21.105 and 19.104.

5.101 Microwave ovens are tested as motor-operated appliances.

5.102 Class III temperature-sensing probes are only subjected to the tests of 22.112.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Modification:

Microwave ovens shall be class I or class II.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Appliances shall be marked with the nominal frequency in megahertz of the ISM band in which they operate.

If the removal of any cover results in microwave leakage exceeding the value specified in 32.1, the cover shall be marked with the substance of the following:

WARNING
MICROWAVE ENERGY
DO NOT REMOVE THIS COVER

~~If an appliance incorporates a socket outlet protected by means of fuses, other than D-type fuses, it shall be marked with the rated current of the relevant fuse. When a miniature fuse link is provided, this marking shall indicate that the fuse link is to have a high breaking capacity.~~

When the exempted provisions of footnote b to Table 101 and/or Table 3 apply, the appliance shall be marked with the substance of "CAUTION: Hot surface", or symbol IEC 60417-5041 (2002-10).

7.6 Addition:



[symbol IEC 60417-5041
(2002-10)]

caution, hot surface

7.12 Addition:

~~The instructions shall state the substance of the following:~~

~~IMPORTANT SAFETY INSTRUCTIONS
READ CAREFULLY AND KEEP FOR FUTURE REFERENCE~~

The instructions shall include the substance of the following warnings:

- **WARNING:** If the door or door seals are damaged, the oven must not be operated until it has been repaired by a competent person.
- **WARNING:** It is hazardous for anyone other than a competent person to carry out any service or repair operation that involves the removal of a cover which gives protection against exposure to microwave energy.

NOTE 101 This warning is applicable if microwave leakage exceeds the limit specified in 32.1 during the removal of any cover.

- **WARNING:** Liquids and other foods must not be heated in sealed containers since they are liable to explode.
- **WARNING:** Ensure that the cavity does not contain any items or utensils that are not suitable for the use with the microwave oven before you operate the appliance.
- **WARNING:** Do not use the cavity for storing combustible products, cooking utensils, or food and similar when the microwave oven is not in use.

The instructions shall include the substance of the following:

- This appliance is intended to be used in household and similar applications such as:
 - staff kitchen areas in shops, offices and other working environments;
 - farm houses;
 - by clients in hotels, motels and other residential environments;
 - bed and breakfast type environments.

If the manufacturer wishes to limit the use of the appliance to less than the above, this ~~has to~~ shall be clearly stated in the instructions.

- The minimum height of free space necessary above the top surface of the oven.
 - ~~Only use utensils that are suitable for use in microwave ovens.~~
- Metallic containers for food and beverages are not allowed during microwave cooking. This requirement is not applicable if the manufacturer specifies size and shape of metallic containers suitable for microwave cooking.
- When heating food in plastic or paper containers, keep an eye on the oven due to the possibility of ignition.
- The **microwave oven** is intended for heating food and beverages. Drying of food or clothing and heating of warming pads, slippers, sponges, damp cloth and similar ~~may~~ can lead to risk of injury, ignition or fire.
- If smoke is observed, switch off or unplug the appliance and keep the door closed in order to stifle any flames.
- Microwave heating of beverages can result in delayed eruptive boiling, therefore care must be taken when handling the container.
- The contents of feeding bottles and baby food jars shall be stirred or shaken and the temperature checked before consumption, in order to avoid burns.
- Eggs in their shell and whole hard-boiled eggs should not be heated in **microwave ovens** since they ~~may~~ can explode, even after microwave heating has ended.
- Details for cleaning door seals, **cavities** and adjacent parts.
- The oven should be cleaned regularly and any food deposits removed.
- Failure to maintain the oven in a clean condition could lead to deterioration of the surface that could adversely affect the life of the appliance and possibly result in a hazardous situation.
- Only use the temperature probe recommended for this oven (for appliances having a facility to use a **temperature-sensing probe**).