

# INTERNATIONAL STANDARD



**Household and similar electrical appliances – Safety –  
Part 2-90: Particular requirements for commercial microwave ovens**

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INTERNATIONAL  
ELECTROTECHNICAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

#### Part 2-90: Particular requirements for commercial microwave ovens

#### FOREWORD

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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 60335-2-90:2015+AMD1:2019 CSV. 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 60335-2-90 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 fifth edition cancels and replaces the fourth edition published in 2015 including its Amendment 1:2019. This edition constitutes a technical revision.

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

- a) the appliance used in area open to the public has been introduced in Clause 1, 3.8.107, 7.12, 8.1.1, 11.8, 20.2, 22.103.2, 22.105 and 22.117;
- b) Subclauses 5.5, 7.12.1, 11.2, 11.7, 20.1 and 20.101 have been modified to add for stacking installation;
- c) Subclauses 7.1, 11.7 and 22.61 have been modified for the appliance outlets and socket-outlets;
- d) Subclause 7.12 has been improved in clarity;
- 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 16.101 has been modified to move the content of 16.101.1, 16.101.2 directly under 16.101.
- h) Subclauses 19.11.2, 19.13, Clause 21, Subclauses 22.105, 22.111 and Annex AA have been improved in clarity;
- i) Annex BB and Annex EE have been modified to add screw requirements.

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

Draft	Report on voting
61B/702/FDIS	61B/706/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://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 commercial microwave ovens.

When a particular subclause of Part 1 is not mentioned in 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** type 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](https://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/m<sup>2</sup> during the initial test (Japan, USA and Canada).
- 6.1: Microwave ovens may be class 0I if the rated voltage does not exceed more than 150 V (Japan).
- 7.12: Some warnings have to be marked on the appliance and be visible to the user (Canada).
- 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 only measured 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/m<sup>2</sup> (Japan and USA).
- 22.111: Microwave leakage is only measured at the end of the test (USA).
- 22.112: Microwave leakage is not to exceed 50 W/m<sup>2</sup> (Japan and USA).
- 22.116: All access to the cavity has to be prevented (USA).
- 27.2: A terminal for an external equipotential conductor is not required (Japan).

**IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**



## 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 2-90: Particular requirements for commercial 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** with a **cavity** door intended for commercial use, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances.

These appliances are not intended for household and similar purposes. They are used for commercial processing of food, also in **areas open to the public**, for example in kitchens of restaurants, canteens, hospitals and in commercial enterprises such as bakeries and butcheries;

- the safety of **combination microwave ovens** with a **cavity** door, the requirements of which are contained in **normative Annex AA**;
- the safety of **microwave ovens** without a **cavity** door and with **transportation means** that are intended for commercial use only, for the heating of food and beverages, the requirements of which are contained in **normative Annex BB**.

**Microwave ovens** covered by **normative Annex BB** have **transportation means** for moving the **load** through the **microwave oven**. Requirements for tunnel microwave ovens and several types of microwave vending machines are covered.

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

**NOTE 101**—In **normative Annex BB**, a **microwave oven** without a **cavity** door and with **transportation means** is described as a **microwave oven**. All clauses of this standard apply to these appliances unless otherwise specified in **normative Annex BB**.

This part of IEC 60335 also takes into account **ordinary persons** having access to the **removing area** of the vending machine.

**NOTE 102**—The appliance ~~may~~ can be built into a vending machine, in which case IEC 60335-2-75 ~~may~~ can also be applicable.

**NOTE 103**—Appliances that use non-electrical energy are within the scope of this standard.

~~In general, this standard does not take into account~~

~~— the use of appliances by young children or infirm persons without supervision;~~

~~— playing with the appliance by young children.~~

As far as is practicable, this standard deals with the common hazards presented by these types of appliances.

This standard does not take into account the use of a **microwave oven** without a **cavity** door and with **transportation means** by **ordinary persons** except in the vicinity of **entrance and exit ports**.

**NOTE 104**—The rationales for particular microwave exposure conditions and measures related to microwave energy being confined by an open structure are given in **normative Annex BB**.

**NOTE 105**—Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on trains, on board ships or board aircraft, additional requirements ~~may~~ can be necessary;
- for appliances intended to be used in tropical countries, special requirements ~~may~~ can be necessary;
- in many countries, the national health authorities, the national authorities responsible for the protection of labour and similar authorities specify additional requirements;
- in many countries, national authorities specify additional requirements to BB.22. ~~119~~101.1.

**NOTE 106**—This standard does not apply to

- ~~household~~ **Microwave ovens** including **combination microwave ovens** for household use covered by IEC 60335-2-25 and used in the following environments by laymen:
  - staff kitchen areas in shops, offices and other working environments;
  - farm houses;
  - by clients in hotels, motels and other residential type environments;
  - bed and breakfast type environments.
- 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).

<https://standards.iteh.ai/catalog/standards/iec/59708650-a2c4-4940-a7f7-f67b1d3f29d4/iec-60335-2-90-2024>

## 2 Normative references

This clause of Part 1 is applicable except as follows.

*Addition:*

IEC 60068-2-6, *Environmental testing – Part 2-6: 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 60335-2-36, *Household and similar electrical appliances – Safety – Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements*

IEC 60335-2-42, *Household and similar electrical appliances – Safety – Part 2-42: Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens*

IEC 60335-2-49, *Household and similar electrical appliances – Safety – Part 2-49: Particular requirements for commercial electric ~~hot cupboards~~ appliances for keeping food and crockery warm*

IEC 60335-2-75, *Household and similar electrical appliances – Safety – Part 2-75: Particular requirements for commercial dispensing appliances and vending machines*

IEC 60436:2004/AMD1:2015, *Electric dishwashers for household use – Methods for measuring the performance*

~~IEC 60436:2004/AMD 1:2009~~

~~IEC 60436:2004/AMD 2:2012~~

IEC 60436:2015/AMD1:2020

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

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs with specified property classes – Coarse thread and fine pitch thread*

ISO 3506-1, *Fasteners – Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs with specified grades and property classes*

ISO 3506-2, *Fasteners – Mechanical properties of corrosion-resistant stainless steel fasteners – Part 2: Nuts with specified grades and property classes*

ISO 3506-3, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 3: Set screws and similar fasteners not under tensile stress*

ISO 3506-4, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 4: Tapping screws*

### 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

#### 3.1 Definitions relating to physical characteristics

##### 3.1.7

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 under the following conditions:

The appliance is operated 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 placed on the centre of the **shelf**. If the **rated microwave power output** exceeds 2 200 W, two such vessels are used and placed contiguously in the **cavity**.

##### ~~3.102~~ 3.1.101

#### rated microwave power output

microwave power output assigned to the appliance by the manufacturer

### 3.5 Definitions relating to types of appliances

#### ~~3.101~~ 3.5.101

##### **microwave oven**

appliance using electromagnetic energy in one or several of the ISM frequency bands<sup>4</sup> between 300 MHz and 30 GHz, for heating food and beverages in a **cavity**

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

#### ~~3.127~~ 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

#### ~~3.111~~ 3.6.106

##### **transportation means**

means to transport the **load** through the **microwave oven**

Note 1 to entry: An example of a **transportation means** is a belt, an arm or an inclined plane.

#### ~~3.113~~ 3.6.107

##### **microwave enclosure**

structure that is intended to confine microwave energy to a defined region

Note 1 to entry: Barriers mounted outside the **microwave enclosure** are not considered a part of the **microwave enclosure**.

Note 2 to entry: A **microwave enclosure** ~~may~~ can consist of a **cavity**, quarter wave chokes (acting by impedance transformation), mode chokes (acting by field pattern mismatching) and microwave energy absorbers.

---

<sup>4</sup>—ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR 11.

~~3.114~~ **3.6.108**

**microwave barrier**

physical barrier, which is microwave transparent, limiting access to the **microwave enclosure**, mounted outside the **microwave enclosure** and can only be removed with the aid of tools

Note 1 to entry: A **microwave barrier** ~~may~~ can be mounted between the **microwave enclosure** and the external cover of the appliance.

Note 2 to entry: Devices such as an array of metal chains or hinged metal plates at **entrance and exit ports** intended to reduce microwave leakage are not considered **microwave barriers**.

Note 3 to entry: Construction requirements are given in BB.22. ~~119~~101.

Note 4 to entry: Informative Annex DD mentions about rationale for the **microwave barrier** and associated leakage test.

~~3.115~~ **3.6.109**

**entrance and exit ports**

openings in the **microwave enclosure** through which **loads** move

~~3.116~~ **3.6.110**

**loading area**

area on which the **load** is placed

~~3.117~~ **3.6.111**

**means of monitored microwave interlock**

**means of microwave interlock** that incorporates a supervision device

~~3.118~~ **3.6.112**

**protective blocking structure**

movable mechanical structure located in the **removing area** limiting access to the **microwave enclosure**

~~3.119~~ **3.6.113**

**removing area**

area from which the **load** is removed

~~3.120~~ **3.6.114**

**viewing opening**

opening in the **cavity** through which the warm up process can be visually monitored

~~3.121~~ **3.6.115**

**fixed means of connection**

all parts of the **microwave enclosure** that are permanently open with the exception of **entrance and exit ports** and **viewing openings**

Note 1 to entry: **Fixed means of connection** ~~may~~ can be used for venting and water flushing.

**3.6.116**

Void

~~3.123~~ **3.6.117**

**means of microwave interlock**

mechanical or electrical safety devices or systems that operate when certain conditions are not fulfilled (e.g. an interlock system that prevents the operation of the microwave generator when a means of access is open)