

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Household microwave ovens – Methods for measuring performance

Fours à micro-ondes à usage domestique – Méthodes de mesure de l'aptitude à la fonction

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IEC Central Office
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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HOUSEHOLD MICROWAVE OVENS – METHODS FOR MEASURING PERFORMANCE

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IEC 60705 edition 4.2 contains the fourth edition (2010-04) [documents 59K/195/FDIS and 59K/198/RVD], its amendment 1 (2014-06) [documents 59K/252/FDIS and 59K/255/RVD] and its amendment 2 (2018-05) [documents 59K/297/FDIS and 59K/299/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60705 has been prepared by subcommittee 59K: Ovens and microwave ovens, cooking ranges and similar appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

The main changes from the previous edition are as follows:

- the definition of rounding is given in 3.5;
- the usable volume and the overall volume are respectively determined in 7.2 and 7.3.

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

In this standard, the following print types are used:

- *test specifications: in italic type*
- notes: in small roman type
- other texts: in roman type.

Words in **bold** in the text are defined in Clause 3.

This standard contains an attached file in the form of an Excel®¹ 97-2003 data sheet program. This file is intended to be used as a complement and does not form an integral part of the standard.

The following differences exist in some countries:

Clause 7: Metric dimensional measures are not in common use (USA).

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION to Amendment 1

This amendment includes the following significant technical changes:

- the usable volume is renamed to calculated volume and the measurement method for the calculated volume is revised (see 7.2), which is in accordance with IEC 60350-1;
- new definitions for **microwave function**, **combination microwave function**, **set to off mode**, **set to standby mode**, **cooling down period** and **food support** in Clause 3;
- a method for measuring the energy consumption of the **microwave function** in Clause 14;
- more precise requirements for instruments and measurements in Table 2;
- additional product specific requirements for measuring the energy consumption of low power modes in Clause 15;
- a method for measuring the energy consumption for the **cooling down period** in Annex F (informative).

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HOUSEHOLD MICROWAVE OVENS – METHODS FOR MEASURING PERFORMANCE

1 Scope

This ~~International Standard~~ document applies to **microwave ovens** for household use. It also applies to **microwave ovens with grills** and **combination microwave ovens**.

This ~~standard~~ document defines the main performance characteristics of ~~household microwave ovens~~ these appliances, which are of interest to the user, and it specifies methods for measuring these characteristics.

NOTE 1 This ~~standard~~ document does not deal with

- **microwave ovens** that cannot accept a load having a diameter of ≥ 200 mm or a height of ≥ 120 mm;
- safety requirements (see IEC 60335-2-25 [1]² and IEC 60335-2-90 [2]).

NOTE 2 This ~~standard~~ document does not apply to ovens incorporating conventional heating means only (see IEC 60350) [3].

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60350-1:2011, *Household electric cooking appliances – Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance*

IEC 60584-2, *Thermocouples – Part 2: Tolerances*

IEC 62301:2011, *Household electrical appliances – Measurement of standby power*

ISO 80000-1:2009, *Quantities and units – Part 1: General*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

microwave oven

appliance using electromagnetic energy in **one or several of the ISM frequency bands of 2 450 MHz between 300 MHz and 30 GHz**, for heating food and beverages in ~~the~~ a cavity

~~NOTE 1 The microwave oven may incorporate a browning element.~~

NOTE 2 1 ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR 11 [4].

² Figures in square brackets refer to the Bibliography.

3.2

combination microwave oven

microwave oven in which ~~the~~ microwave energy is combined with ~~thermal~~ energy transfer by forced air circulation, by conventional heating, by hot steam and by steam

Note 1 to entry: For definitions of a forced air circulation function, conventional heating function, hot steam function and steam function, IEC 60350-1:2016 is relevant.

3.3

microwave transparent

property of a material having negligible absorption and reflection of microwaves

NOTE The relative permittivity of a microwave transparent material is less than 7 and the relative loss factor is less than 0,015.

3.4

rated voltage

voltage assigned to the appliance by the manufacturer

3.5

microwave function

function using electromagnetic energy in one or several of the ISM frequency bands between 300 MHz and 30 GHz for heating food and beverages in a cavity

3.6

combination microwave function

heat transfer by electromagnetic energy simultaneously or sequentially with energy transfer by forced air circulation, conventional heating, by hot steam or by steam

Note 1 to entry: For definitions of a forced air circulation function, conventional heating function, hot steam function and steam function, IEC 60350-1:2016 is relevant.

3.7

set to off mode

action where the product is switched off using appliance controls or switches that are accessible and intended for operation by the user during normal use to attain the lowest power consumption that may persist for an indefinite time while connected to a main power source and used in accordance with the manufacturer's instructions

NOTE 1 All actions required to **set to off mode** like for example empty the water tank, remove food, close the door, etc. have to be taken.

NOTE 2 See 3.5 of IEC 62301:2011 for the definition of "off mode".

3.8

set to standby mode

action where the product is switched to standby using appliance controls or switches that are accessible and intended for operation by the user during normal use to attain the lowest power consumption that may persist for an indefinite time while connected to a main power source and used in accordance with the manufacturer's instructions

NOTE See 3.6 of IEC 62301:2011 for the definition of "standby mode".

3.9

cooling down period

unstable condition persisting after completion of the active mode and the appliance is **set to off mode** where the power consumption may change without any intervention by the user

3.10

food support

horizontal support in the cavity on which the load is placed

NOTE If the appliance is fitted with a turntable, the turntable is the **food support**. The **food support** can also be a shelf or a reciprocating tray. If recommended by manufacturer's instruction also the cavity bottom can be the **food support**.

3.11

microwave oven with grill

microwave oven in which microwave energy is combined with grill

Note 1 to entry: For a definition of a grill, IEC 60350-1:2016 is relevant.

3.12

microwave function with grill

heat transfer by electromagnetic energy simultaneously or sequentially with energy transfer by radiant heat typically from the top

Note 1 to entry: For a definition of a grill, IEC 60350-1:2016 is relevant.

4 Classification

Appliances are classified according to their type and characteristics.

4.1 According to type

- **Microwave ovens**
- **Combination microwave ovens**
- **Microwave oven with grill**

The manufacturers shall define the primary cooking function of the appliance, **microwave function** or thermal heat. The primary cooking function has to be measured with an existing method according to energy consumption.

If the primary cooking function is declared as a **microwave function** IEC 60705 shall be applied for energy consumption measurement. If the primary cooking function is declared as a thermal heat IEC 60350-1 shall be applied for energy consumption measurement.

NOTE There is currently no measurement method for the energy consumption for grilling and steam functions.

The type of oven shall be stated in the report.

4.2 According to characteristics

- Usable cavity dimensions
- ~~– With or without a turntable~~
- Dimensions of shelves
- Moved **food support**, e.g. reciprocating tray, turntable
- Possible thermal heating modes (grilling, hot air, steam function etc.).

The characteristics of the oven shall be stated in the report.

5 List of measurements

~~Performance is measured by the tests listed in Table 1.~~

Table 1 shows which measurement shall be applied for which function.

Table 1 – List of measurements

Item of measurement	Clause or subclause	Reproducibility	Microwave ovens ^a	Combination microwave ovens
External dimensions	7.1	Yes	±	±
Usable internal dimensions and usable volume	7.2	Yes	±	±
Overall internal dimensions and overall volume	7.3	Yes	±	±
Microwave power output	8	Yes	±	
Efficiency	9	Yes	±	
Square tank	10.2	Yes	±	
Multiple cup	10.3	Yes	±	
Heating beverages	11.1	Yes	±	
Heating simulated food	11.2	Yes	±	
Egg custard	12.3.1	No	±	
Sponge cake	12.3.2	No	±	
Meatloaf	12.3.3	No	±	
Potato gratin	12.3.4	No		*
Cake	12.3.5	No		*
Chicken	12.3.6	No		*
Meat defrosting	13.3	No	±	
* — Test is applicable.				
^a — Except for the tests of 10.2, these tests are also applicable to combination microwave ovens when operated in the microwave only mode.				

Measurements	Clause or subclause	Applicable to				
		microwave function	microwave function with grill	microwave function in combination with forced air circulation or conventional heating	microwave function in combination with hot steam	microwave function in combination with steam
Dimensions and volume	7	Applicable to all appliances which are under the scope.				
Microwave power output	8	x	-	-	-	-
Efficiency	9	x	-	-	-	-
Square tank	10.2	x	-	-	-	-
Multiple cup	10.3	x	-	-	-	-
Heating beverages	11.1	x	-	-	-	-
Heating simulated food	11.2	x	-	-	-	-
Egg custard	12.3.1	x	-	-	-	x
Sponge cake	12.3.2	x	-	-	-	x