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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Household electric cooking appliances -

Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance

Appareils de cuisson électrodomestiques

Partie 1: Cuisinières, fours, fours à vapeur et grils – Méthodes de mesure de l'aptitude à la fonction



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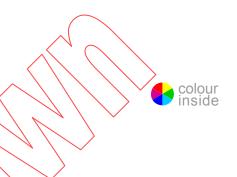
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INTERNATIONAL STANDARD

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Household electric cooking appliances –
Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance



COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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CONTENTS

FO	REW	טאט	5		
1	Scop	pe . 7			
2	Norm	mative references			
3	Term	ms and definitions			
4	List	of measurements	9		
	4.1	Dimensions and mass	9		
	4.2	Oven and combi steam oven	10		
	4.3	Steam oven and combi steam oven	10		
	4.4	Grill	10		
	4.5	Warming compartments			
	4.6	Cleaning	10		
5	General conditions for the measurements				
	5.1	Test room.			
	5.2	Electricity supply	11		
	5.3	Instrumentation	11		
	5.4	Positioning the appliance	12		
	5.5	Preheating.	12		
	5.6	Setting of controls	12		
6	Dime	Instrumentation Positioning the appliance Preheating. Setting of controls ensions and mass Overall dimensions Usable internal dimensions and calculated volume of ovens	12		
	6.1	Overall dimensions	12		
	6.2	Usable internal dimensions and calculated volume of ovens	14		
		6.2.1 General	14		
		6.2.1 General	15		
		6.2.3 Usable width			
		6.2.4 Usable depth	16		
		6.2.5 Calculated volume	16		
	6.3	Overall internal dimensions and overall volume of ovens	16		
		6.3.1 General	16		
	<	6.3.2 Qverall height (H)			
		6.3.3 Overall width (W)			
		6.3.4 Overall depth (D)			
		6.3.5 Overall volume of rectangular cavities			
		6.3.6 Overall volume of non-rectangular cavities			
	6.4	Dimensions of shelves			
	6.5	Dimensions of grill grids			
	6.6	Dimensions of warming compartments			
	6.7	Level of shelf			
	6.8	Mass of the appliance			
7	Ovens and combi steam ovens				
	7.1	General			
	7.2	9 1 7			
	7.3	Accuracy of the control			
	7.4	Energy consumption and time for heating a load			
		7.4.1 General			
		7.4.2 Test load	20		

		7.4.3	Measurement	21		
		7.4.4	Evaluation and calculation	24		
		7.4.5	Reporting of test results	25		
	7.5	Heat distribution				
		7.5.1	General	25		
		7.5.2	Shortbread	25		
		7.5.3	Small cakes	27		
	7.6	Ability	to supply heat	33		
		7.6.1	Fatless sponge cake			
		7.6.2	Apple pie			
8	Stear	n ovens	and combi steam ovens			
	8.1	ution of steam	36			
	0.1	8.1.1	General	36		
		8.1.2	In one disease	36		
		8.1.3	Quantity	36		
		8.1.4	Procedure			
		8.1.5	Assessment			
	8.2	O. I.O	to construct one			
	0.2	8.2.1				
		-				
			Ingredients			
		8.2.3	Procedure			
	0.0	8.2.4	Assessment load load load load load load load load			
	8.3					
		8.3.1	General			
		8.3.2	Ingredients			
			Quantity and a state of the sta			
		8.3.4	Procedure			
		8.3.5	Assessment			
9	Grills					
	9.1	Genera		41		
	9.2	Grilling	area \\	41		
		9.2.1	General	41		
	<	9.2.2	Procedure	42		
		9.2.3	Assessment	42		
	9.3	Grilling		42		
		9.3.1	General	42		
		9.3.2	Ingredients	42		
		9.3.3	Procedure	42		
		9.3.4	Assessment	43		
10	Warn	ning con	npartments	43		
11	Clear	ning		43		
		•	ic self-cleaning ovens			
		, ,	with catalytic cleaning			
12			er			
		• •				
		•	ive) Colour measuring instrument			
			ive) Shade chart			
Anr	nex C	(informa	ative) Addresses of suppliers	49		
Δnr	nev D	(normat	ive). Description of the test brick	53		

Annex E (informative) Calculation sheet: Energy consumption of electric ovens	55
Annex F (normative) Green shade chart – Cooked peas and broccoli	58
Annex G (informative) Reference system for assessing the steaming performance	60
Bibliography	61
Figure 1 – Position of the thermocouple for measuring ambient temperature	11
Figure 2 – Dimensions of appliances	13
Figure 3 – Dimensions of built-in ovens	14
Figure 4 – Usable internal dimensions and calculated volume of ovens	15
Figure 5 – Device for checking the level of shelves	18
Figure 6 – Example of a method of fixing a thermocouple for the test of 7.3	21
Figure 7 – Shape of the nozzle for extruding pastry	26
Figure 8 – Position of pastry strips on the baking sheet	26
Figure 9 – Convex colour sample	31
Figure 10 – Template for the sectioning of small cakes	32
Figure 11 – Reference values of cooking time (T _{ref})	41
Figure A.1 – Colour measuring instrument	46
Figure D.1 – Position of the thermocouples	54
Table 1 – Oven settings	22
Table 2 – Ingredients	28
Table B.1 – Classification of shade numbers	47
Table B.2 – Examples for the shade charts	47
Table C.1 – Ingredient specification	49
Table C.2 – Food mixer – revolutions	51
Table C.3 – mixing time and setting	51
Table F.1 – Specification of relevant green shade charts	58

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD ELECTRIC COOKING APPLIANCES -

Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance

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International Standard IEC 60350-1 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.

This first edition of IEC 60350-1 is related to IEC 60350:1999 which shall be separated in two parts: one part for cooking ranges, ovens and steam ovens and the other part for hobs. This part 1 of IEC 60350 covers cooking ranges, ovens, steam ovens and grills, and IEC 60350-2 covers hobs.

This edition includes the following significant technical changes with respect to IEC 60350:1999:

- The scope (Clause 1) is revised so that ovens covered by this standard may be with or without microwave power;
- The usable volume is reworded in calculated volume (see 6.2);
- Performance measurements for steam ovens are described in 7.3 and in Clause 8;

 An option for assessing the heat distribution with a digital measurement system is included in 7.5.2.4.

IEC 60350:1999 will be withdrawn after the publication of IEC 60350-1 and IEC 60350-2.

In this standard, terms in bold characters are defined in Clause 3.

This publication contains an attached file in the form of an Excel 97 file. This file is intended to be used as a complement and does not form an integral part of the publication.

The text of this standard is based on the following documents:

FDIS	Report on voting
59K/232/FDIS	59K/235/RVD

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

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

A list of all the parts in the IEC 60350 series, under the general title Household electric cooking appliances, can be found on the IEC website.

The committee has decided that the contents of this publication 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

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

The contents of the corrigenda of February 2012 and August 2013 have been included in this copy.

IMPORTANT - The 'colour inside' logo on the cover page of this publication 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.

HOUSEHOLD ELECTRIC COOKING APPLIANCES -

Part 1: Ranges, ovens, steam ovens and grills – Methods for measuring performance

1 Scope

This part of IEC 60350 specifies methods for measuring the performance of electric **cooking** ranges, ovens, steam ovens, and grills for household use.

The ovens covered by this standard may be with or without microwave function.

Manufacturers should 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 in the instruction manual as a microwave function, IEC 60705 is applied for energy consumption measurement. If the primary cooking function is declared as a thermal heat, then IEC 60350-1 is applied for energy consumption measurement.

NOTE 1 If the primary function is not declared by the manufacturer microwave function and thermal heat should be measured as far as it is possible.

NOTE 2 For measurement of energy consumption and time for heating a load (see 7.4), this standard is furthermore not applicable to:

- microwave combination function;
- ovens with reciprocating trays or turntable;
- small cavity ovens;
- ovens without adjustable temperature control;
- heating functions other than defined in 3.12 to 3.14;
- appliances with only solo steam function (3.15).

NOTE 3 This standard does not apply to

- microwave ovens (IEC 60705),
- portable appliances for cooking, grilling, steaming and similar functions (IEC 61817).

This standard defines the main performance characteristics of these appliances which are of interest to the user and specifies methods for measuring these characteristics.

This standard does not specify requirements for performance.

- NOTE 4 Some of the tests which are specified in this standard are not considered to be reproducible since the results may vary between laboratories. They are therefore intended for comparative testing purposes only.
- NOTE 5 This standard does not deal with safety requirements (IEC 60335-2-6 and IEC 60335-2-9).
- NOTE 6 Appliances covered by this standard may be built-in or for placing on a working surface or the floor.
- NOTE 7 There is no measurement method for the energy consumption for grilling and steam functions available.

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 60584-2:1982, Thermocouples – Part 2: Tolerances Amendment 1(1989)

IEC 62301:20051, Household electrical appliances – Measurement of standby power

ISO 7724 (all parts), Paints and varnishes - Colorimetry

ISO 11664-2², Colorimetry – Part 2: CIE standard illuminants for colorimetry

CIE 15.2:1986, Colorimetry

3 Terms and definitions

For the purposes of this document the following terms and definitions apply.

3.1

cooking range

appliance having a hob and at least one oven. It may incorporate a grill

3.2

hob

appliance or part of an appliance which incorporates one or more cooking zones

NOTE A hob is also known as a cooktop. Methods for measuring performance of hobs are described in IEC 60350-2.

3.3

oven

appliance or compartment of a **cooking range** in which food is cooked by radiation, by natural convection, by forced-air circulation or by a combination of these heating methods

3.4

pyrolytic self-cleaning oven

oven in which cooking deposits are removed by heating the **oven** to a sufficiently high temperature

3.5

steam ovens

appliance or compartment of a cooking range in which food is cooked mainly by steam condensation at ambient pressure. Appliance are fitted with an own steam generator

NOTE Steam does not mean the evaporated water from the food.

3.6

combi steam ovens

appliance or compartment of a cooking range in which food is cooked by combination of 3.3 and 3.5

NOTE 1 Combi steam ovens with only steam assist function also exist. For these ovens the steam function can only be tested if this function is described in the manual instruction or if the appliance provides a setting for steam function.

NOTE 2 Steam does not mean the evaporated water from the food.

This document has been replaced by a new edition (2011), but for the purposes of this standard, the 2005 edition is cited.

Also published as CIE S 014-2.

3.7

grill

appliance or part of an appliance in which food is cooked by radiant heat

3.8

oven with catalytic cleaning

oven in which cooking deposits are removed by breaking them down on a special coating

3.9

warming compartment

separate compartment in which dishes are placed in order to preheat them prior to serving, or in which food is maintained at serving temperature

3.10

small cavity oven

oven with the following dimensions related to the calculated volumes:

- both width and depth < 250 mm,
- or height < 120 mm

NOTE The definition of small cavity ovens in this standard is due to the size of the test load used in 7.4.

3.11

multiple cavity appliance

appliance that has more than one separate **oven** cavity in which food is cooked and which can be controlled independently, but cannot be installed separately

3.12

conventional heating function

heat transmission to the food by radiation and natural convection only

NOTE This does not include ovens that have a top heating element only (i.e. for the grilling function).

3.13

forced air circulation function

heat transmission to the food by forced air convection, i.e. circulating the air with the help of a fan

NOTE This does not include circulated air functions which operate a grill element only.

3.14

hot steam function

heat transmission to the food by generated steam in combination with radiation and / or convection at ambient pressure (approximately 1 bar) and with a temperature > 100 °C

3.15

steam function

heat transmission to the food mainly by condensation of steam at ambient pressure (approximately 1 bar) with a temperature \leq 100 °C

4 List of measurements

4.1 Dimensions and mass

The following measurements are carried out:

- overall dimensions (see 6.1);
- internal dimensions of ovens and steam ovens (see 6.2);
- dimensions of shelves and steaming accessories (see 6.4);

- dimensions of grill grids (see 6.5);
- dimensions of warming compartments (see 6.6);
- level of the shelf (see 6.7);
- mass of the appliance (see 6.8).

4.2 Oven and combi steam oven

The following tests are carried out:

- preheating the empty oven (see 7.2);
- accuracy of the control (see 7.3);
- energy consumption and time for heating a load (7.4);
- heat distribution (see 7.5);
- ability to supply heat (see 7.6).

4.3 Steam oven and combi steam oven

The following tests are carried out:

- distribution of steam (8.1);
- ability to supply steam (8.2);
- performance test with maximum load (8.3)

4.4 Grill

The following tests are carried out:

- grilling area (see 9.2);
- grilling (see 9.3).

4.5 Warming compartments

The following test is carried out:

temperature control and energy consumption (see Clause 10).

4.6 Cleaning

The following tests are carried out:

- cleaning of pyrolytic self-cleaning ovens (see 11.1);
- cleaning of ovens with catalytic cleaning (see 11.2).

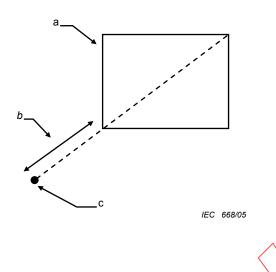
5 General conditions for the measurements

5.1 Test room

The tests are carried out in a substantially draught-free room in which the ambient temperature is maintained at 20 °C \pm 5 °C.

For tests 7.2, 7.4 and 7.5.3., (23 \pm 2) °C shall be maintained during the complete test.

This ambient temperature is measured at a point that is at the same height as the centre of the calculated volume of the **oven** cavity in test and at a distance of 0,5 m diagonally from one of the front edges of the appliance, see Figure 1.



Key

- a oven (top view)
- b 0,5 m
- c thermocouple

Figure 1 - Position of the thermocouple for measuring ambient temperature

The measurement of the ambient temperature shall not be influenced by the appliance itself or by any other appliance.

5.2 Electricity supply

The appliance is supplied at rated voltage, ± 1 %

If the appliance has a rated voltage range, the tests are carried out at the nominal voltage of the country where the appliance is intended to be used.

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For tests 7.2, 7.4 and 7.5.3,

- the supply voltage shall be maintained at the main terminal at the rated voltage \pm 1 %, while the heating elements are switched on;
- the supply frequency shall be at the rated frequency \pm 1 % throughout the test. If a frequency range is indicated, then the test frequency shall be the nominal frequency of the country in which the appliance is intended to be used.

NOTE In case of a fixed cable, the plug (or the end of the cable) is the reference point to maintain the voltage.

5.3 Instrumentation

The temperature measuring instrument including thermocouples shall have an accuracy of $0.5 \, \text{K}$ within the temperature range of $0 \, ^{\circ}\text{C}$ to $100 \, ^{\circ}\text{C}$ and an accuracy of $2 \, \text{K}$ within the temperature range $100 \, ^{\circ}\text{C}$ to $300 \, ^{\circ}\text{C}$.

The energy measuring meter shall have an accuracy of 1 %.

For tests 7.2 and 7.4:

- air temperature measurements in the empty oven are made with a thermocouple with a welded point (not with a black copper plate);
- temperature measurements in the brick (see 7.3) are made with two thermocouples with 1 mm steel tube diameter, class 1 according to IEC 61591. The thermocouple shall be accurate to \pm 1,5 K;

NOTE The steel tube of the thermocouple eases the insertion of the thermocouple into the brick. Other types of thermocouples may be used provided they are shown to give the same results. (Care should be taken that the measuring point is the first contact point of the two thermowires.)

- the temperature measurement system excluding the thermocouple shall be accurate to \pm 1,0 K;
- the energy measurements shall be accurate to \pm 1,5 % or \pm 10 Wh, whatever is the greater;
- the measurement of the voltage shall be accurate to \pm 0,5 %;
- the measurements of mass shall be accurate to ± 3 g;
- the measurements of time shall be accurate to ± 5 s:
- the scale for weighing the ingredients shall be accurate to \pm 0,1 g.

5.4 Positioning the appliance

Built-in appliances are installed in accordance with the instructions for installation. Other appliances are placed with their back against a wall, unless otherwise specified in the instructions.

Floor-standing appliances are positioned between kitchen cabinets. Table-top appliances are positioned away from side walls.

For tests 7.2 and 7.4 on **ovens** with integrated air-extraction by a fan (or similar device) to the outside of the building, the air outlet is discharged into a flue which has a pressure drop of 50 Pa when there is an airflow of 200 m³/h.

NOTE 1 The condition of measurement for ovens with integrated air-extraction is similar to IEC 61591.

NOTE 2 For installation of the appliance it should be ensured that the surface is horizontal.

5.5 Preheating

The appliance is initially at room temperature. However, if preheating is specified, the appliance is preheated in accordance with the instructions for use. If no instructions are given, the appliance is considered to be preheated after the thermostat has switched off the first time.

5.6 Setting of controls

The control is set to give the temperature specified for the test. However, if the temperature cannot be attained due to the construction of the control, the nearest setting related to the specified temperature is chosen.

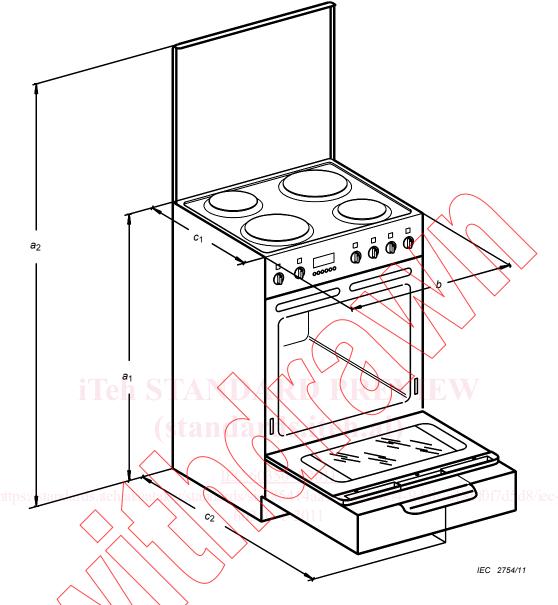
6 Dimensions and mass

NOTE Clause 6 is also applicable to steam ovens.

6.1 Overall dimensions

The overall dimensions of the appliance are measured and stated in millimetres as follows:

 cooking ranges and other appliances placed on a surface are measured as shown in Figure 2;



- Key
- height from the supporting surface to the hob surface
 NOTE If adjustable feet are provided, the height is measured with the feet in both extreme positions.
- b overall width of the appliance
- a₂ maximum height from the supporting surface to the uppermost part of the appliance, with any lid in the open position
- \boldsymbol{c}_1 depth of the appliance, ignoring any knobs, etc.
- ${\it c}_{\it 2}$ maximum depth of the appliance, with any doors and drawers fully open

Figure 2 – Dimensions of appliances