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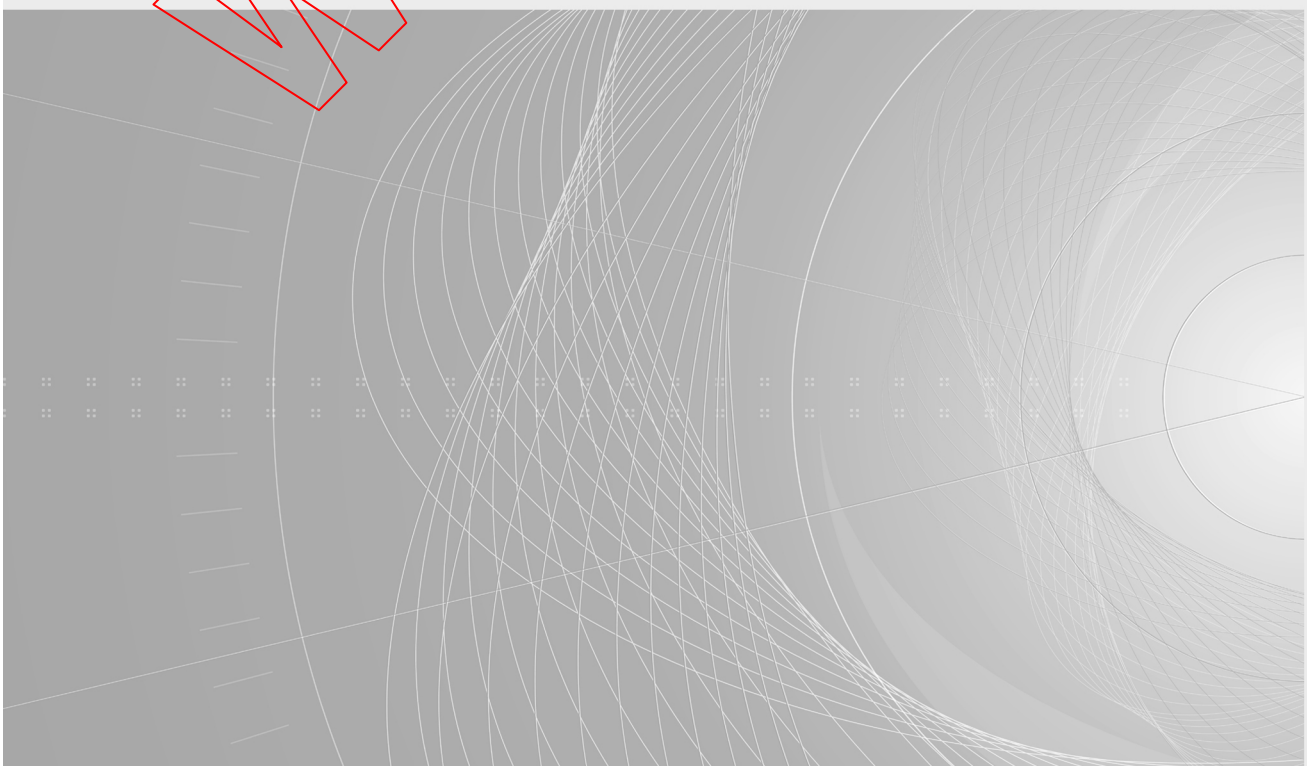
INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric cooking ranges, hobs, ovens and grills for household use – Methods for measuring performance

Cuisinières, foyers de cuisson, fours électriques et grils à usage domestique – Méthodes de mesure de l'aptitude à la fonction



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC COOKING RANGES, HOBS, OVENS AND GRILLS FOR HOUSEHOLD USE – METHODS FOR MEASURING PERFORMANCE

FOREWORD

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International Standard IEC 60350 has been prepared by subcommittee 59B: Cooking ranges, working tables, ovens and similar appliances, of IEC technical committee 59: Performance of household electrical appliances.

This consolidated version of IEC 60350 consists of the second edition (1999) [documents 59B/67/FDIS and 59B/68/RVD], its amendment 1 (2005) [documents 59K/104/FDIS and 59K/111/RVD] and its amendment 2 (2008) [documents 59K/161/FDIS and 59K/163/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 2.2

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result 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- withdrawn,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.

ELECTRIC COOKING RANGES, HOBS, OVENS AND GRILLS FOR HOUSEHOLD USE – METHODS FOR MEASURING PERFORMANCE

1 Scope

This International Standard defines methods for measuring the performance of electric **cooking ranges**, **hobs**, **ovens** and **grills** for household use.

NOTE 1 Appliances covered by this standard may be built-in or for placing on a working surface or the floor.

NOTE 2 This standard does not apply to

– microwave ovens (IEC 60705),

– portable appliances for cooking, grilling and similar functions*

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

NOTE 3 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.

This standard does not specify requirements for performance.

NOTE 4 This standard does not deal with safety requirements (IEC 60335-2-6 and IEC 60335-2-9).

NOTE 5 For measurement of energy consumption and time for heating a load (see 8.3), this standard is furthermore not applicable to:

– microwave combination **ovens**;

– small cavity ovens;

– **ovens** without adjustable temperature control;

– heating functions other than defined in 3.16 to 3.18.

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 62301:2005, *Household electrical appliances – Measurement of standby power*

ISO 7724-1:1984, *Paints and varnishes – Colorimetry – Part 1: Principles*

ISO 7724-2:1984, *Paints and varnishes – Colorimetry – Part 2: Colour measurement*

ISO 7724-3:1984, *Paints and varnishes – Colorimetry – Part 3: Calculation of colour differences*

ISO/CIE 10526:1991, *CIE standard colorimetric illuminants*

ISO/CIE 10527:1991, *CIE standard colorimetric observers*

CIE 15.2:1986, *Colorimetry*

* IEC 61817, in preparation.

3 Definitions

For the purposes of this International Standard the following 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.

3.3
cooking zone
part of the **hob** or area marked on the surface of a **hob** on which pans are placed for heating

3.4
hotplate
part attached to the surface of a **hob** which forms a **cooking zone**

3.5
solid hotplate
hotplate having a closed surface which is usually constructed from cast iron with an integrated heating element

3.6
tubular hotplate
hotplate having a surface which is formed by the configuration of a tubular sheathed heating element in a substantially flat plane

3.7
glass ceramic hob
hob in which the heating elements are located beneath a glass ceramic surface

3.8
induction cooking zone
cooking zone on which the pan is heated by means of eddy currents

NOTE 1 The eddy currents are induced in the bottom of the pan by the electromagnetic field of a coil.

NOTE 2 The hob surface may be of glass ceramic.

3.9
grill
appliance or part of an appliance in which food is cooked by radiant heat

3.10
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

3.11
pyrolytic self-cleaning oven
oven in which cooking deposits are removed by heating the **oven** to a sufficiently high temperature

3.12
oven with catalytic cleaning
oven in which cooking deposits are removed by breaking them down on a special coating

3.13
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

3.14
small cavity oven
oven with the following dimensions related to the usable volume:
– 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 8.3.

3.15
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

3.16
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).

3.17
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.

3.18
hot steam function
heat transmission to the food with hot steam (Temperature >> 100 °C) at ambient pressure (1 bar)

4 List of measurements

The performance of the appliance is determined by the tests listed in 4.1 to 4.6.

4.1 Dimensions and mass

The following measurements are carried out:

– overall dimensions (see 6.1);
– dimensions of **hotplates** and **cooking zones** (see 6.2);
– internal dimensions of **ovens** (see 6.3);
– dimensions of shelves (see 6.4);
– dimensions of **grill grids** (see 6.5);
– dimensions of **warming compartments** (see 6.6);
– level of **hotplates** (see 6.7);
– distance between the **hotplates** or **cooking zones** (see 6.8);
– level of the shelf (see 6.9);
– mass of the appliance (see 6.10).

4.2 Hotplates and cooking zones

The following tests are carried out:

– ability to heat water (see 7.1);
– ability to control the temperature of a load (see 7.2);
– heat distribution (see 7.3).

4.3 Oven

The following tests are carried out:

– preheating the empty oven (see 8.1);
– accuracy of the control (see 8.2);
– energy consumption and time for heating a load (8.3);
– heat distribution (see 8.4);
– ability to supply heat (see 8.5).

4.4 Grill

The following tests are carried out:

– grilling area (see 9.1);
– grilling (see 9.2).

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:

– spillage capacity of hobs (see 11.1);
– cleaning of pyrolytic self-cleaning ovens (see 11.2);
– cleaning of ovens with catalytic cleaning (see 11.3).

5 General conditions for the measurements

Unless otherwise specified, the measurements are made under the following conditions.

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 ± 5 °C.

For tests 8.1, 8.3 and 8.4.2, 23 °C ± 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 usable 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 11.

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.

For tests 8.1 and 8.3:

- the supply voltage shall be maintained at the main terminal at the rated voltage ±1 %, while the heating elements are switched on;
- the supply frequency shall be at the rated frequency ±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 K within the temperature range of 0 °C to 100 °C and an accuracy of 2 K within the temperature range 100 °C to 300 °C.

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

For tests 8.1 and 8.3:

- 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 8.3) are made with two thermocouples with 1 mm steel tube diameter, class 1 according to IEC 60584-2. The thermocouple shall be accurate to ± 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 ±1,0 K.
- the energy measurements shall be accurate to ±1,5 % or ±10 Wh, whatever is the greater;
- the measurement of the voltage shall be accurate to ±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 ±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 8.1 and 8.3 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 m^3/h.

NOTE The condition of measurement for ovens with integrated air-extraction is similar to IEC 61591:1997.

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

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 1;
- built-in **ovens** are measured as shown in Figure 2;
- built-in **hobs** are measured as shown in Figure 3.

6.2 Dimensions of hotplates and cooking zones

The main dimensions of **hotplates** and **cooking zones** are determined as follows:

- for **solid hotplates**, the diameter of the surface intended to come into direct contact with the bottom of saucepans is measured;
- for **tubular hotplates**, the diameter of the smallest periphery excluding any lead-in section is measured;
- for **glass ceramic hobs**, the diameters of the **cooking zones** are measured.

The dimensions are indicated in millimetres rounded to the nearest 5 mm.

If the **hotplates** or **cooking zones** are not circular the dimensions are determined as follows:

- for rectangular shapes, the lengths of the sides are measured;
- for elliptical and similar shapes, the major and minor dimensions are measured.

NOTE If the markings identifying **cooking zones** are not clear, this is stated.

6.3 Usable internal dimensions and usable volume of ovens

Removable items specified in the user instructions shall be removed before a measurement is carried out.

The measurement of the usable oven volume is to be carried out at ambient temperature.

The height, width and depth of the usable volume in the cavity shall be measured in accordance with 6.3.1 to 6.3.3. The measurement procedure is also shown in Figure 4a.

For verification purposes a gauge, as shown in Figure 4b, shall be used to determine all of the three dimensions. The gauge shall be used without appreciable force.

Dimensions are stated in millimetres.

6.3.1 Usable height

The usable height is the maximum length of a cylinder with a diameter of 200 mm reaching vertically from the centre of the cavity floor to the lowest point on the ceiling. The lowest point of the ceiling can be constituted by a lamp, a heating element or similar object in the area of the cylinder.

In the event that either the width or the depth of the cavity is less than 250 mm, the diameter of the cylinder to be measured shall be reduced to 120 mm.

NOTE The centre of the cavity bottom is defined by the middle of the usable depth and the middle of the usable width.

6.3.2 Usable width

The usable width is the maximum length of a cylinder with a diameter of 200 mm reaching horizontally from the left-hand side wall to the right-hand side wall of the cavity.

In the event that either the height or the depth of the cavity is less than 250 mm, the diameter of the cylinder to be measured shall be reduced to 120 mm.

NOTE The centre of the side wall of the cavity is defined by the middle of the usable depth and the middle of the usable height.

6.3.3 Usable depth

The usable depth is the maximum length of a cylinder with a diameter of 200 mm reaching horizontally from the centre of the rear wall to the inner face of the closed door.

In the event that either the width or the height of the cavity is less than 250 mm, the diameter of the cylinder to be measured shall be reduced to 120 mm.

For measuring the usable depth, the gauge is placed on a support in such a way that the axis lies horizontally in the centre of the cavity, the axis being extended slightly over the expected usable depth. The door is closed carefully so that the gauge is compressed to give the usable depth.

NOTE The centre of the rear wall of the cavity is defined by the middle of the usable height and the middle of the usable width.

6.3.4 Usable volume

The usable volume is calculated from these three dimensions and is stated in litres rounded to the next full litre.

6.4 Overall internal dimensions and overall volume of ovens

Where the surfaces forming the boundaries of the cavity incorporate protrusions or depressions, the planes used for measurement shall be those comprising the largest percentages of the total areas of the surfaces. Holes in surfaces shall be disregarded when calculating areas for this determination.

The following volumes or spaces shall be disregarded:

– those occupied by removable items specified by the manufacturer as not essential for the operation of the appliance, such as shelves, racks or temperature probes;

– those occupied by heating elements;

– those occupied by minor irregularities in the cooking compartment walls, including covers over temperature sensors and lamps;

– those occupied by the convection baffle;

– corner radii smaller than 50 mm at the intersections of the interior surfaces of the cooking cavity.