IEC 60350-2

Edition 2.0 2021-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Household electric cooking appliances – Part 2: Hobs – Methods for measuring performance

Appareils de cuisson électrodomestiques – Partie 2: Tables de cuisson – Méthodes de mesure de l'aptitude à la fonction

IEC 60350-2:2017-08/AMD1:2021-05(en-fr)

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ELECTROTECHNICAL
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ELECTROTECHNIQUE
INTERNATIONALE

ICS 97.040.20 ISBN 978-2-8322-9787-2

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD ELECTRIC COOKING APPLIANCES –

Part 2: Hobs – Methods for measuring performance

AMENDMENT 1

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Amendment 1 to IEC 60350-2:2017 has been prepared by subcommittee 59K: Performance of household and similar electrical cooking appliances, of IEC technical committee 59: Electric dishwashers.

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

FDIS	Report on voting
59K/329/FDIS	59K/332/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 Amendment 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/.

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- withdrawn,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

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1 Scope

Delete the third paragraph regarding the exclusion of portable appliances.

Add an additional note:

NOTE 3 This document is also applicable for portable appliances with similar functionality that were previously covered by the withdrawn IEC 61817.

3 Terms and definitions

Add the following new definitions:

3.19
open loop control
mode of operation in which the value of the power output is set at a desired value, without taking into account the difference between the actual and desired values

EXAMPLE A cooking zone with an electronic, electromechanical, or mechanical control of the power input, which is controlled independently of the actual temperature in the cookware.

[SOURCE: IEC 60050-314:2001, 314-05-02, modified – In the term itself, "stabilization" has been replaced by "control"; in the definition, "output" has been replaced by "power output", the words "by external means" have been removed and the example has been added.]

3.20
closed loop control
mode of operation in which the value of the output is influenced by comparing of a reference value by the measured value and using the difference between those values, directly or indirectly, to maintain the output quantity at the desired value with a given uncertainty

EXAMPLE The value can be a measured temperature at the cookware or under the glass ceramic.

[SOURCE: IEC 60050-314:2001, 314-05-01, modified – In the term itself, "stabilization" has been replaced by "control"; in the definition, "is compared with a reference value and in which the difference between those values is used" is replaced by "is influenced by comparing of a reference value by the measured value and using the difference between those values" and the example has been added.]

7.5.4.1 Evaluation

Add the following new paragraphs after the penultimate paragraph ("Fourthly…."):

If $\overline{T} < 90\,°C$ from t_{90} to t_s, the energy consumption measurement shall be repeated with an increased setting. If $\overline{T} > 91\,°C$ from t_{90} to t_s, check the next lower setting in order to guarantee the lowest possible setting.

Annex H provides a guidance to determine the proper simmering setting.

Replace the existing subclause 9.2 as follows:

9.2 Continuous frying

9.2.1 Purpose

The purpose of this test is to determine if the **cooking zone** or **cooking area** can steadily maintain a medium-high temperature when frying pancakes continuously.

For **cooking zones**, the test is specified for sizes that are typically used for frying, i.e. the following diameters of **cooking zones**:

– diameter of ≥ 160 mm to < 190 mm;
– diameter of ≥ 190 mm to ≤ 220 mm.

For **cooking areas,** one frying pan is used that corresponds to the diameter given for **cooking zones**.

The test is applicable for **open loop controlled** and **closed loop controlled cooking zones** and **cooking areas**.

NOTE 1 This test is applicable for comparative testing only.

NOTE 2 Owing to the pan's construction (specified in 9.2.2), the test is not suitable for assessing the heat distribution.

9.2.2 Specification of the frying pan

– Material: stainless steel bottom cladded with several layers, which typically clad a stainless steel layer (e.g. AISI 430 or AISI 439 steel), an aluminium layer and a ferromagnetic layer – often also called "sandwich layer bottom" or "aluminium clad".
– Flatness: < 0,003 d at ambient temperature, where d is the bottom diameter of the pan. A convex-shaped bottom plate is not allowed. The flatness of the base shall be checked before starting a measurement.
– Thickness of the bottom: > 3 mm.
– No aluminium or copper spots on the surface and without an aluminium ring on the outside.
– No ferromagnetic disc bottom, ferromagnetic coating or sputtering.
– Without reliefs and stamps, except for one smaller stamp with a diameter less than 30 % of the flat bottom diameter in the centre.
– No magnetic sidewall.
– Inner surface of the pan with non-stick surface coating, e.g. polytetrafluoroethylene (PTFE).
– Dimension: the size of pan shall match the size of the cooking zone (see 6.3.2 or 6.3.3) as much as possible. However, it may vary by a maximum of +20 mm and minimum of −10 mm.

The diameter of the inner bottom of the frying pan is relevant. The inner bottom diameter corresponds to the usable surface of the inner base. Follow the instruction of the cookware manufacturer regarding the inner bottom diameter of the cookware. If no instructions are given, measure the inner diameter with a flexible tape. For this, position the flexible tape on the inner bottom surface, searching the maximum measureable diameter.

For **cooking zones** and **cooking areas** that work exclusively with a supplied frying pan, the supplied pan shall be used.

Use the same frying pan for the pre-test and the main test. Use the frying pan without greasing.

Record the frying pan used and its measured inner bottom diameter.

9.2.3 Recipe and amounts

The quantities of ingredients for one batch of pancakes are specified in Table 8. Always prepare the same amount and discard any surplus mixture. Ingredients and amounts, as defined in Table 8, shall be used.

Table 8 – Ingredients

Ingredients	Frying pan, inner bottom diameter	
	≥ 150 mm and < 195 mm	≥ 195 mm and ≤ 240 mm
	in g	in g
White wheat flour, without raising agent	280 ± 2	365 ± 2
Fresh milk, fat content 3 % to 4 %	540 ± 2	705 ± 2
Egg (without shell) / whole egg	220 ± 2	290 ± 2
Salt	6 ± 0,5	8 ± 0,5
Baking powder Phosphate baking powder, (double acting), Diphosphate (E450 46,7 %); Natriumcarbonat (E500 33,3 %); wheat starch	8 ± 0,5	11 ± 0,5

Sieve the flour and baking powder to the other ingredients. Stir all components for (300 ± 10) s using a food processor. Make sure that all ingredients are thoroughly mixed and that there are no lumps in the batter.

Cover and store the batter at room temperature for 60 min to 120 min. Then, skim off any foam from the surface and sieve it.

Table 11 – Quantity of batter per pancake

Inner bottom diameter mm	Quantity of batter g
150 to 165	45 ± 2
166 to 180	55 ± 2
181 to 195	65 ± 2
196 to 210	75 ± 2
211 to 225	85 ± 2
226 to 240	100 ± 2

Use a ladle or measure the portions of batter according to the values in Table 11 with measuring cups. If cups are used, fill and empty the cups first in order to coat the cups before the final amount is weighed.

9.2.4 Pre-test

In order to define the heating up phase for the pan, determine the hottest area of the pan.

For **radiant cooking zones**, **induction cooking zones** and for **cooking areas**, the outer diameter of the frying pan is marked on the glass ceramic to simplify keeping the same position during the frying process.

For **cooking zones**, ensure that the frying pan is centred.

For **cooking areas**, position the frying pan in accordance with Annex A.

For **hobs with closed loop controls**, the manufacturer's instructions regarding the positioning of the cookware shall be followed.

Always position the frying pan empty.

Heat the empty frying pan with the highest setting. However, a boost function shall not be used. If the inner bottom of the pan has reached a medium-high temperature, determine the hottest area of the bottom. A contact probe or thermography may be used.

Record the position/location of the hottest area as the area where the temperature is measured in the main test.

9.2.5 Main test

The **hob** and the frying pan shall be at ambient temperature.

Position the frying pan by following the procedure described in the pre-test.

– For **open loop controlled cooking zones** and **cooking areas**:

Switch the control to the highest setting. A boost function shall not be used.

Take a contact temperature probe and control the temperature rise at the hottest area determined in the pre-test.

For **solid hotplates**, **radiant cooking zones** and **tubular hotplates**, switch the power to continuous setting recommended by the manufacturer's instructions when the temperature reaches a temperature of (190 ± 5) °C. For **induction cooking zones** and **cooking areas**, switch the power to the continuous setting recommended by the manufacturer's instructions when the temperature reaches (220 ± 5) °C.

If no recommendation is given, then set the control to a setting slightly higher than the medium one.

EXAMPLE For a control with 9 possible settings, setting 6 is chosen.

Pour the quantity of batter into the pan not later than 15 s after switching the power to the continuous setting and distribute it by using a batter spreader. Always ensure that the batter is poured and spread with similar handling, for example, pouring into the centre of the pan and spreading clockwise. Start measuring the frying time after filling but before distributing the batter in the pan.

Fry the first pancake until the batter dries to the point that it no longer drips when turning. Record the frying time in s. If necessary, adjust the frying time when baking the second pancake. Then, turn the pancake and fry the second side for approximately 20 s.

Fry ten pancakes. Keep the setting unchanged. Fry all pancakes exactly with the time determined for the second pancake, first side. The time in between frying the pancakes shall not exceed 20 s.

– For **closed loop controlled cooking zones** and **cooking areas**:

Regarding heating up and the continuous setting, follow the recommendations given in the manufacturer's instructions.

If no recommendation is given and a temperature setting is available, choose a setting as close as possible to 200 °C.

Pour the quantity of batter into the pan no later than 15 s after switching the power to continuous setting and distribute it by using a batter spreader. Always ensure that the batter is poured and spread with similar handling, for example, pouring into the centre of the pan and spreading clockwise. Start measuring the frying time after filling, but before distributing the batter in the pan.

Fry the first pancake until the batter dries to the point that it no longer drips when turning. Record the frying time in s. Then, turn the pancake and fry the second side for approximately 20 s.

Fry ten pancakes. Keep the setting unchanged. Fry all pancakes exactly with the time determined for the second pancake, first side. The time in between frying the pancakes shall not exceed 20 s.

9.2.6 Assessment

9.2.6.1 General

For all pancakes, assess the first side fried, not the side after turning the pancake.

The outer circle of the pancake (= rim) is not considered (approximately 10 mm). However, neglect the two pancakes fried first. Only the pancakes number 3 to 10 are included in the assessment. Dark and light spots that have formed on the pancake surface, for example by bubbles, are not taken into account.

For **cooking zones** tested with a bigger frying pan, only this area of each pancake is assessed which corresponds to the diameter of the cooking zone.

The browning intensity for each pancake is determined using the shade chart described in Annex D. The browning intensity per pancake is defined by the predominant shade chart.

If more than one cooking zone is tested, only the results achieved with the same frying pan can be compared with each other and classified.

9.2.6.2 Criteria of validity

Results of the main test in accordance with 9.2.5 are valid and shall only be accepted if the following criteria are fulfilled:

– Target browning intensity

The browning intensity of the pancake assessed firstly (= 3rd pancake) shall be in the range of NCS 10 ± 2.

– Frying time

The frying time for the first side of all pancakes shall be within 50 s to 85 s.

If one of these criteria is not fulfilled, the main test shall be repeated with an adapted setting or varying the time.

9.2.6.3 Criterion of assessment

The difference of the browning intensity ΔNCS between all pancakes assessed is calculated and stated.

Owing to the influence of the frying pan chosen for the comparative test series, a deviation of maximum 4 steps of the NCS grades is allowed.

Table 12 shows an example for the assessment of pancakes.

Table 12 – Example for the assessment of pancakes

Pancakes	1[a]	2[a]	3	4	5	6	7	8	9	10
Browning intensity per pancake (predominant NCS shade chart)	10	11	12	11	12	12	13	13	13	13
Criterion of validity			NCS 10 ± 2							
Criterion of assessment			Δ NCS = 11 − 13 = −2 This difference can be caused by the frying pan and is neglected. The tested cooking zone can steadily maintain a medium-high temperature when frying pancakes continuously.							
[a] Pancakes 1 and 2 are ignored for the calculation of browning intensity.										

Annex F
(informative)

Replace the existing text of Clause F.7 by the following:

See Clause 9.

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