SLOVENSKI STANDARD
SIST EN 50242:2016

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Električni pomivalni stroji za gospodinjstva - Preskusne metode za merjenje lastnosti

Electric dishwashers for household use - Test methods for measuring the performance

Lave-vaisselle électriques à usage domestique - Méthodes de mesure de l'aptitude à la fonction

Ta slovenski standard je istoveten z: **EN 50242:2016**

ICS:

97.040.40	Pomivalni stroji	Dishwashers

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EUROPEAN STANDARD

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EN 50242
EN 60436

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English Version

Electric dishwashers for household use - Methods for measuring the performance (IEC 60436:2004 , modified + A1:2009 , modified + A2:2012 , modified)

Lave-vaisselle électriques à usage domestique - Méthodes de mesure de l'aptitude à la fonction (IEC 60436:2004 , modifiée + A1:2009 , modifiée + A2:2012 , modifiée)

Elektrische Geschirrspüler für den Hausgebrauch - Messverfahren für Gebrauchseigenschaften (IEC 60436:2004 , modifiziert + A1:2009 , modifiziert + A2:2012 , modifiziert)

This European Standard was approved by CENELEC on 2016-04-11. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50242:2016 / EN 60436:2016) consists of the text of IEC 60436:2004, IEC 60436:2004/A1:2009 and IEC 60436:2004/A2:2012 prepared by SC 59A "Electric dishwashers" of IEC/TC 59 "Performance of household and similar electrical appliances", together with the common modifications prepared by CLC/TC 59X "Performance of household and similar electrical appliances".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-04-11
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-04-11

This document supersedes EN 50242:2008 / EN 60436:2008.

EN 50242:2016 / EN 60436:2016 includes the following significant technical changes with respect to EN 50242:2008 / EN 60436:2008:

a) introduction of new combined cleaning and drying performance assessment (Clause 7);

b) new data on expanded measurement uncertainty (Annex ZB);

c) new Annexes ZZA, ZZB and ZZC.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60436:2004, IEC 60436:2004/A1:2009 and IEC 60436:2004/A2:2012 are prefixed “Z”.

In this document, the common modifications to the International Standards are indicated in red.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with Regulations (EU) No 1059/2010, (EU) No 1016/2010 and (EC) No 1275/2008, see informative Annexes ZZA, ZZB and ZZC, which are integral parts of this document.

Endorsement notice

The text of the International Standard IEC 60436:2004, IEC 60436:2004/A1:2009 and IEC 60436:2004/A2:2012 was approved by CENELEC as a European Standard with agreed common modifications.

COMMON MODIFICATIONS

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Bibliography

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Table ZZB.1 – Correspondence between this European Standard and Commission Regulation (EU) No 1016/2010 of 10 November 2010 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household dishwashers [OJ L 293, 11.11.2010] and Commission's standardization request M/481

Table ZZC.1 – Correspondence between this European Standard and Commission Regulation (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment [OJ L 339, 18.12.2008] and Commission's standardization request M/481

Introduction

Replace *the existing introductions by the following:*

This new edition of EN 50242 / EN 60436 has been developed based on the mandate M/481 to CEN, CENELEC and ETSI for standardisation in the field of household dishwashers, which relates to Directive 2009/125/EC of the European Parliament and of the Council and to Directive 2010/30/EU of the European Parliament and of the Council.

Mandate M/481, issued by the European Commission, includes the standardization task to develop measures in testing household dishwashers, which ensure “that the prospective harmonised standard(s) includes a procedure that avoids an appliance being programmed to recognize the test cycles, and reacting specifically to them, with the exclusion of test cycle recognition that is active only during the manufacturing of the appliance”.

CLC/TC 59X/WG 2 has identified the deviating test conditions in the previous edition of this standard for the cleaning performance assessment (soiled test load), including relevant energy and water consumption measurements, and the drying performance assessment (unsoiled test load), excluding energy and water consumption measurements, to be the main potential source for an appliance being programmed to recognize the test cycle, and reacting specifically to them. Therefore, the Combined Cleaning and Drying evaluation (CCD) has been established to repeal former deviating test conditions, and to improve alignment with common real life household conditions.

This document submits all common modifications necessary for the application of IEC 60436:2004/A1:2009 and IEC 60436:2004/A2:2012 in Europe. Accordingly, it incorporates the changes made in EN 50242:2008/A11:2012 / EN 60436:2008/A11:2012.

In addition, this document submits modifications to Annex O “Additional aspects of the energy consumption of dishwashers” based on the FDIS draft of IEC 60436 4th Edition prepared by SC 59A "Electric dishwashers" of IEC/TC 59 "Performance of household and similar electrical appliances".

1 Scope

In the first sentence of the first paragraph, ***replace*** 'International Standard' *by* 'European Standard'.

2 Normative references

Add *the following new references:*

EN 50564:2011, *Electrical and electronic household and office equipment – Measurement of low power consumption* (IEC 62301:2011, modified)

EN ISO 80000-1:2013, *Quantities and units – Part 1: General (ISO 80000-1:2009 + Cor 1:2011)*

ISO 3310 series, *Test sieves - Technical requirements and testing*

Modify *the referenced documents as follows:*

EN 60350 series, *Household electric cooking appliances* (IEC 60350 series)

EN 60704-2-3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-3: Particular requirements for dishwashers* (IEC 60704-2-3)

EN 60704-3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values* (IEC 60704-3)

EN 60705, *Household microwave ovens – Methods for measuring performance* (IEC 60705)

EN 60734, *Household electrical appliances – Performance – Hard water for testing* (IEC 60734)

AHAM DW-1~~:2003~~, *Performance testing methods for household electric dishwashers*

3 Terms and definitions

Replace *the heading of Clause 3 by the following:*

3 Definitions related to the appliance

3.16
off mode

Delete *the Note 2.*

3.17
left on mode

Replace *the definition by the following:*

the lowest power consumption mode that may persist for an indefinite time after the completion of the programme, opened and unlatched door without any further intervention of the user

3.18
delay start mode

Delete *the note.*

***Add** the following new definitions:*

3.Z1
left on mode duration
time for the dishwasher to revert automatically to off mode after the end of the programme with the door unlatched and opened; mode applies if the test dishwasher is equipped with a power management system

Note 1 to entry: The left on mode duration is declared by the manufacturer.

Note 2 to entry: End of programme is reached when end of programme indicator is activated or when all activities cease if there is no end of programme indicator (according to 3.6 and 3.7).

3.Z2
power management system
system within the test dishwasher which allows it to revert automatically to off mode

4 List of measurements

***Replace** the first bullet point by the following:*

- *the combined cleaning and drying performance according to Clause 6 and Clause 7.*

***Delete** the second bullet point.*

5 General conditions for measurements

5.1 General

***Replace** the last sentence of the second paragraph by:*

The reference machine shall be in accordance with the description given in Annex E or Annex N respectively.

***Add** a new paragraph after the last sentence:*

Rounding shall only be applied to reported values in Clause Z1, Clause Z2 and Annex L. If numbers have to be rounded, they shall be rounded to the nearest number according to EN ISO 80000-1:2013, B.3 Rule B. If the rounding takes place to the right of the comma, the omitted places shall not be filled with zeros.

5.1.1 Free standing dishwashers

***Replace** the second sentence by the following:*

The dishwasher manufacturer's instructions regarding installation and use of the dishwasher shall be followed.

5.2 Conditioning of the machine under test and sequence of test procedures

***Modify** the two paragraphs of the subclause as follows:*

Before conducting the performance tests, the dishwasher shall be operated for at least three complete cycles using no load or a clean load with reference detergent (specified in 5.7) and with rinse agent (specified in 5.8). If noise measurements should be done, they should be carried out before any performance measurements and in accordance to Clause 8. No additional cycles shall be carried out on the machine under test between the sequential steps specified in the following procedure.

The tests of cleaning performance and drying performance shall be performed simultaneously. The determination of energy, water and cycle/programme time (Clause 8) shall be done in conjunction with the combined cleaning and drying performance (Clauses 6 and 7) tests.

5.3 Electricity supply for machines

Replace *the text of Subclause 5.3.1.1 Voltage by the following:*

The supply voltage shall be maintained at 230 V ± 1 %.

The supply voltage measured during the tests shall be recorded.

Modify *Subclause 5.3.2.1 Voltage as follows:*

The supply voltage shall be set at 230 V a.c. and maintained within ± 1 % throughout the test. The measured voltage shall be reported.

5.4 Test programme

Replace *the first sentence of the first paragraph by:*

For energy labelling and / or ecodesign purposes, the programme to be tested shall be the cycle which cleans normally soiled tableware (standard cleaning and drying cycle) and shall be named “eco”. The name “eco” shall be used once and exclusively for this standard test programme. The only other additional information which could be combined with the term “eco” is temperature.

Replace *the text of the note by:*

The formatting of the phrase “eco“ is not restricted in terms of font, font size, case sensitivity, colour or accentuations like the usage of italic letter or underlining etc.

Replace *the second paragraph by the following:*

The same programme shall be used for measuring the combined cleaning and drying performance according to Clauses 6 and 7, the energy and water consumption and time according to Clause 8, and the noise according to Clause 9, if tested.

5.5 Ambient conditions

For both drying methods, ***replace*** *"(20 ± 2) °C" by "(23 ± 2) °C".*

For the oven drying method, ***replace*** *"(55 ± 10) % RH" by "(55 ± 5) % RH".*

Add *the following sentence after the last paragraph:*

For energy labelling and / or ecodesign purposes, the air-dry method is not permitted.

5.6.2 Water supply – Temperature

Add *the following paragraph after the list:*

The volume of the water pipe after the measurement device for temperature up to the connection point to the water inlet hose of the test dishwasher shall not exceed 250 ml.

If a bypass to drain water is installed at each connection to the water inlet hose(s) of the dishwasher the bypass shall be opened before starting tests until the water inlet temperature is in the required range. If the temperature is measured in the circulation loop, the volume of the spur taking the water from the circulation loop shall not exceed 250 ml.

For energy labelling and / or ecodesign purposes, the use of hot water is not permitted.

5.6.3 Hardness

In the second sentence of the first paragraph, ***replace*** *'IEC 60734' by 'EN 60734'.*

Add *the following sentences after the first paragraph:*

For energy labelling and / or ecodesign purposes, if the appliance is not equipped with a water softener, the hardest water which is permitted by the manufacturer's instructions shall be used, otherwise only water of (2,5 ± 0,5) mmol/l shall be used.

5.7 Detergent

Replace *the text of the paragraph by the following:*

For energy labelling and / or ecodesign purposes, the reference detergent B, as described in Annex D, shall be used.

The quantity shall be as recommended by the manufacturer, but it shall not be more than

– 2,5 g/place setting for dishwashers with a capacity of ≥ 10 place settings;

– 3,0 g/place setting for dishwashers with a capacity of < 10 place settings.

If no recommendation is given by the manufacturer, use

– 2,0 g/place setting for dishwashers with a capacity of ≥ 10 place settings;

– 2,5 g/place setting for dishwashers with a capacity of < 10 place settings.

The total quantity of detergent, in grams, used for main wash and pre-wash during the tests shall be recorded.

The detergent shall be placed in the dishwasher immediately prior to starting the programme. If a dispenser is incorporated in the dishwasher, it shall be used. The dispenser shall be clean and dry prior to the placement of detergent. In the absence of manufacturer's recommendations, the detergent shall be placed in the main compartment of the dispenser.

Detergent from the same batch shall be used for the dishwasher under test and for the reference dishwasher.

The detergent shall be stored in waterproof bags in quantities of no more than 1 kg in a cool and dry atmosphere. It shall be used within six months after production and within one month of opening.

Before using, the detergent shall be homogenized in accordance with ISO 607 for example using a sample dividing device.

NOTE For a supplier of a suitable sample dividing device, see Annex F.

5.8 Rinse agent

Add *the following sentence between the first paragraph and NOTE 1:*

For energy labelling and / or ecodesign purposes, only Formula III rinse aid (acidic) shall be used.

6 Cleaning performance

Replace *the heading of Clause 6 by the following:*

6 Combined cleaning and drying performance tests

6.1 General and purpose

Modify *the first paragraph as follows:*

The purpose of this test is to measure how well the appliance cleans and dries normally soiled place settings and serving pieces.

Replace *the first sentence of the second paragraph by:*

The tests are carried out in parallel with one of the reference machines specified in Annex E or Annex N.

6.2 Load

Add *between the first and second paragraphs the following:*

For energy labelling and / or ecodesign purposes, test load items according to Annex A shall be used.

In the paragraph between Note 1 and Note 2, ***replace*** *"with 6.7" by 'with Clause 7".*

Replace *the second note by the following:*

NOTE 2 Reconditioning in a dishwasher should be done using detergent B (refer to Annex D).

Add *after the last paragraph the following new paragraphs:*

The items should be used for not more than 200 cycles where soiling is applied.

After each cleaning and drying performance test with five to eight cycles a special normalization cycle shall be performed in order to avoid residual scale formation on the test load. For this purpose clean load is loaded into a dishwasher (no test or reference machine) having a normal / daily use programme. This programme is run with 30 g of anhydrous fine granular citric acid (Supplier see Clause F.Z2) instead of detergent for one cycle.

In case new test load is started to use in the tests, ten cycles using detergent (specified in 5.7) and rinse aid (specified in 5.7) shall be performed in order to avoid the deviations in the test results of tests performed with new load and used load.

Soup plates (specified in Clause A.2) soiled with oat flakes (specified in 6.4.5) shall be free of starch residues from the previous tests.

NOTE 3 This can be checked by Lugols solution after each cleaning performance test. Lugols solution is a 1 % Iodine/potassium iodide solution (Merck 109261), which may be obtained from supplier mentioned in Clause F.Z2.

6.3 Soiling agents

Add *the following new paragraphs after the last paragraph of 6.3:*

All soiling materials used for the reference machine and for the machine under test shall be from the same batch.

For energy labelling and / or ecodesign purposes, it is necessary that the soilings have the same properties in all laboratories to ensure comparable and reproducible results.

Soilings from the same batch are offered by the supplier mentioned in Clause F.14.

Delete *the last sentence of the subclause.*

6.4 Preparation and application of soiling agents

Modify *the first sentence of the first paragraph as follows:*

Unless specifically stated otherwise, all soiling agents are to be freshly prepared for each test and have to be finally prepared and applied to the test items at the date of testing.

Add *the following Note after Note 1:*

NOTE 2 Refer to Annex ZA for illustration of soiling.

6.4.1.1 Items required for preparation

Add *the following sentence at the end of the first bullet point:*

For energy labelling and / or ecodesign purposes, only UHT milk shall be used.

Modify *the last bullet point as follows:*

– Pipette (10 ml) (see Clause F.Z1)

6.4.1.2 Conversion

Replace *the entire paragraph by the following:*

If the power levels of the microwave oven used are not equal to the rated values (780 W and 150 W) according to Annex G but within the given tolerances the heating times shall be corrected as follows:

Bosch model HMT752F [1]	Approved microwave oven for tests (e.g. Bosch HMT742C; HMT743C; HMT75M42 [1])	
$t_{u,1}=\frac{P_1 \cdot t_1}{P_{u,1}}$	$t_{u,1}=\frac{P_1 \cdot Z}{P_{u,1}}$	(Z1)
$t_{u,2}=\frac{P_2 \cdot t_2}{P_{u,2}}$	$t_{u,2}=\frac{P_2 \cdot t_2}{P_{u,2}}$	(Z2)

where

P_1 is 780 W;

P_2 is 150 W;

t_1 is 4 min;

t_2 is 10 min;

1) "Bosch HMT…" is the trade name of a product supplied by Bosch. This information is provided for the convenience of users of this European Standard and does not constitute an endorsement by the CENELEC of this trademark. Items of the similar specification may be used if they can be shown to lead to equivalent results.

Z is the recommended time setting in min in the attached data sheet which will be delivered together with the microwave oven as described in Clause G.1;

$P_{u,1}$ is the actual max. power level used in W (measured according to EN 60705);

$t_{u,1}$ is the corresponding heating time to be used in min;

$P_{u,2}$ is the actual reduced power level used in W [determined by equation (Z3)];

$t_{u,2}$: is the corresponding actual heating time to be used in min.

$$P_{u,2} = \frac{P_{u,1}}{t_p}\left(t_{on} - t_{up}\right) \qquad \text{(Z3)}$$

where

t_p is the time of the elementary period of the magnetron in the microwave oven at the reduced power level in s;

t_{on} is the time the microwave oven is on within the elementary period in s;

t_{up} is 1,6 s, which is the magnetron filament heating-up time.

Use levels, which are close to the rated levels.

6.4.1.3 Pre-heating the microwave oven

***Replace** the content of the subclause by the following:*

Before cooking the milk in the glasses, heat up the microwave oven as follows:

- Place six glasses, each filled with 50 ml of water, in the microwave oven;
- Place the glasses symmetrically in a circle of 160 mm diameter (centre of the circle = centre of the glass turntable). See Figure 1.
- Operate the microwave oven for 4 min or respectively Z min depending on the oven type (see above) at a power level of 780 W and then for 10 min at a power level of 150 W, or at the corrected cooking times calculated above for the power level used. The time Z can be found in the technical instructions for the particular microwave.

After pre-cooking, take the water-filled glasses out of the microwave oven.

6.4.1.4 Application

***Add** the following between the first and the second paragraphs:*

It is recommended to use the pipette of Socorex Company. Details are given in Clause F.Z1.

6.4.1.5 Cooking process

***Modify** the third and fourth paragraphs:*

After the cooking period in the microwave oven, the colour of the cooked milk shall be compared with the shade chart in Annex K. The colour at the bottom of the glass shall have at least colour of shade No. 4 on the shade chart and not exceed colour of shade No. 6.

Small areas of the milk skin shall not be darker than colour of shade No. 12 on the shade chart.