KODUMAJAPIDAMISES KASUTATAVAD ELEKTRILISED NÕUDEPESUMASINAD. TOIMIVUSE MÕÕTEMEETODID

Electric dishwashers for household use - Methods for measuring the performance

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 60436:2020 sisaldab Euroopa standardi EN 60436:2020 ingliskeelset teksti.	This Estonian standard EVS-EN 60436:2020 consists of the English text of the European standard EN 60436:2020.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 27.03.2020.	Date of Availability of the European standard is 27.03.2020.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EN 60436

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ICS

Supersedes EN 50242:2016 and all of its amendments and corrigenda (if any)

English Version

Electric dishwashers for household use - Methods for measuring the performance (IEC 60436:2015 , modified)

Lave-vaisselle électriques à usage domestique - Méthodes de mesure de l'aptitude à la fonction (IEC 60436:2015 , modifiée)

Elektrische Geschirrspüler für den Hausgebrauch - Messverfahren für Gebrauchseigenschaften (IEC 60436:2015 , modifiziert)

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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
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European foreword

This document (EN 60436:2020) consists of the text of IEC 60436:2015 prepared by IEC/TC 59, "Electric dishwashers", 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) 2020-09-27
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2023-03-27

This document supersedes EN 50242:2016 and all of its amendments and corrigenda (if any).

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

EN 60436:2019 includes the following significant technical changes with respect to EN 50242:2016/EN 60436:2016:

— new test load with a bigger variety of materials and shapes, including pots, mugs, plastic items and more bowls;

— new phosphate-free reference detergent reflecting more market relevant composition of ingredients;

— more precise soiling procedure;

— new reference materials;

— new definitions and measurement procedures for low power modes.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60436:2015 are prefixed “Z”.

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

Endorsement notice

The text of the International Standard IEC 60436:2015 was approved by CENELEC as a European Standard with agreed common modifications.

1 Modification of Introduction

***Replace** by:*

"This edition of the standard EN 60436 *Electric dishwashers for household use - Methods for measuring the performance* was developed for the future EU energy labelling and ecodesign scheme and therefore based on the principle described in the mandate M/481 to CEN, CENELEC and ETSI for standardisation in the field of household dishwashers relating to REGULATION (EU) 2017/1369 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU.

Mandate M/481, issued by the European Commission, includes the standardisation task to develop measures in testing household dishwashers, which ensure that the prospective harmonized standard takes into account improved test conditions and test materials to better reflect the user behaviour and the state of the art at European and international level. Test conditions described in IEC 60436:2015 indeed represent today's usage behaviours of European households in a better manner.

Common modifications were developed to further improve the standard for its application concerning EU energy labelling and ecodesign purposes, specifically in regard to the measurement procedure for low power modes, uncertainty of measurements, and test burden."

2 Modification of Clause 1 "Scope"

1 Scope

***Modify** first sentence of first paragraph:*

"This European Standard applies to electric **dishwashers** for household and similar use that are supplied with hot and/or cold water."

3 Modification of Clause 2 "Normative references"

***Delete** IEC 62301.*

***Add** as follows:*

"

EN 50564, *Electrical and electronic household and office equipment – Measurement of low power consumption*

EN 50643, Electrical and electronic household and office equipment – Measurement of networked standby power consumption of edge equipment
"

4 Modification of Clause 3 "Terms and definitions"

Modify *3.1.14 as follows:*

"**programme**
series of **operations** which are pre-defined within the **dishwasher** and which are declared as suitable for specified levels of soil and/or type of load ~~and together form a complete cycle~~

Note1 to entry: Usually an end of programme indicator signals the end of the programme and the user has access to the load."

In 3.1.15, ***Add*** *a note:*

"Note Z1 to entry: The cycle can be equal or last longer than the programme."

Modify *3.1.16 as follows:*

"**cycle time**
length of time beginning with the initiation of the cycle (of the selected programme), excluding any user programmed delay, until all activity ceases ~~(i.e. the end of the cycle)~~"

Modify *3.1.17 as follows:*

"**programme time**
length of time beginning with the initiation of the ~~**cycle** (of the selected **programme)**~~ **programme**, excluding any user programmed delay, until an end of **programme** indicator is activated and the user has access to the load

Note 1 to entry: If there is no end of **programme** indicator, the **programme time** is equal to the **cycle time**."

Add *note to entry to 3.1.21:*

"Note Z1 to entry: This may include several separate steps during the programme(s)."

Modify *3.1.25 as follows:*

"**end of** ~~cycle~~ **programme mode**
mode that begins immediately after the completion of the **programme**, and continues without any further intervention of the user

Note Z1 to entry: This mode can persist indefinitely or may be of limited duration if the **dishwasher** is equipped with a power management system."

Modify *3.1.26 as follows:*

"**left on mode**
mode that begins as soon as the **dishwasher** door has been opened and / or unlatched by the user after the completion of the **programme**, and continues without any further intervention of the user

Note Z1 to entry: In some products this mode can be equivalent to off mode.

Note Z2 to entry: This mode can persist indefinitely or can be of limited duration if the dishwasher is equipped with a power management system. "

***Replace** 3.1.27 as follows:*

"**off mode**
condition in which the household dishwasher is connected to the mains and is not providing any function; the following shall also be considered as off mode:
(a) conditions providing only an indication of off mode;
(b) conditions providing only functionalities intended to ensure electromagnetic compatibility"

***Replace** 3.1.28 as follows:*

"**delay start mode**
condition where the user has selected a specified delay to the beginning of the selected programme.

Note Z1 to entry: This mode is only applicable to dishwashers that provide a delay start function for the user.""

***Modify** 3.1.29 as follows:*

"**end of ~~cycle~~ programme mode duration**
time for the **dishwasher** to revert automatically to **off mode** after the end of the ~~cycle~~ **programme** without any further intervention of the operator"

***Delete** Note 1 to entry in 3.1.29 and renumber the following note.*

***Modify** 3.1.30 as follows:*

"**left on mode duration**
time from the start of **left on mode** until the **dishwasher** reverts automatically to off mode

Note Z1 to entry: This time span is only applicable to dishwashers equipped with power management systems."

***Delete** Note 1, 2 and 3 to entry:*

***Add** the following new entries:*

"**3.1.Z1**
all activity ceases
power consumption decreases to a low steady state fluctuating by no more than 10% or 0,1W, whichever is the greater, over a period of at least 60 min.

Note Z1 to entry: The current waveform shall be sampled at a frequency of 1000 Hz and averaged over the duration of 60 seconds.

3.1.Z2
standby mode
condition where the household dishwasher is connected to the mains and provides only the following functions, which may persist for an indefinite time:
(a) reactivation function, or reactivation function and a mere indication of enabled reactivation function; and/or
(b) information or status display; and/or
(c) detection function for emergency measures.

3.1.Z3
network
communication infrastructure with a topology of links, an architecture, including the physical components, organizational principles, communication procedures and formats (protocols).

3.1.Z4
standby mode in condition of networked standby
condition of networked standby means a condition where the household dishwasher is connected to the mains and provides only the reactivation function through a connection to a network, which may persist for an indefinite time.

Note Z1 to entry: This mode is only applicable to **dishwashers** that provide a connection function to a network."

3.2 Symbols

3.2.4 Symbols related to the measurements (Clause 8 and Annex U)

Modify *the symbol "$E_{IEC15\ °C\text{-}m}$" by:*

"$E_{EN\ 15\ °C\text{-}m}$"

Modify *the symbol "$E_{IEC15\ °C\text{-}e}$" by:*

"$E_{EN\ 15\ °C\text{-}e}$"

Add following subclause:

"

3.2.Z1 Symbols related to low power modes (Annex ZA)

P_{sm} the measured power consumption in W in standby mode

P_{o} the measured power consumption in W in off mode

P_{ns} the measured power consumption in W in standby mode in condition of networked standby

P_{ds} the measured power consumption in W in delay start mode"

5 Modification of Clause 5 "General conditions for measurements"

In clause 5.1.1, ***modify*** *the second paragraph as follows:*

"Manufacturers should provide sufficient information on relevant test conditions for the **test machine**, including installation instructions, **detergent** amounts, **rinse aid** settings, **water softener** settings and any other information relevant to identifying regeneration operations (if applicable), filter type, and loading schemes."

5.2 Sequence of test procedures and conditioning of the test machine

In clause 5.2, ***modify*** *the last sentence of the third paragraph as follows:*

"The determination of energy consumption, water consumption~~, cycle time~~ and **programme time** (Clause 8) shall be done concurrently with the combined cleaning and drying performance test (Clause 6 and 7)."

5.3 Electricity supply for machines

5.3.1 Electricity supply for test machine

5.3.1.1 Voltage

Modify *as follows:*

"The supply voltage of the **test machine** shall be maintained at 230 V ± 1 %. The supply voltage measured during the tests shall be recorded."

5.3.1.2 Frequency

Modify *as follows:*

"The supply frequency shall be set at 50 Hz and maintained within ±1 % throughout the test. The measured frequency shall be reported."

5.3.2 Electricity supply for the reference machine

5.3.2.1 Voltage

Modify *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 paragraph as follows:*

"For energy labelling and ecodesign purposes, the **programme** to be tested for performance measurements shall be the "ECO" **programme** which is intended to clean normally soiled tableware (standard cleaning and drying cycle).

NOTE Z1 For noise testing see Clause 9. "

5.5 Ambient conditions

Modify *as follows:*

"The following ambient conditions shall be maintained throughout the soiling, drying and measurement process. The conditions shall be reported.

– Ambient temperature of the room: (23 ± 2) °C
– Relative humidity: (55 ± 5) % "

5.6 Water

5.6.2 Water temperature

Add *the following paragraph after the note:*

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

5.6.3 Water hardness

Replace *in the 2nd sentence of the first paragraph 'IEC 60734' by 'EN 60734'*

Add *the following paragraph after the first paragraph:*

"For energy labelling and 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

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

"The reference **detergent** D, as described in Annex E, shall be used in the **reference** and **test machines**~~.~~"

6 Modification of Clause 6 "Combined cleaning and drying performance test"

6 Combined cleaning and drying performance test

6.4 Preparation and application of soiling agents

6.4.2 Milk

6.4.2.1 General

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, UHT milk shall be used."

6.4.3 Tea

6.4.3.1 General

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, tea as described in Annex L shall be used."

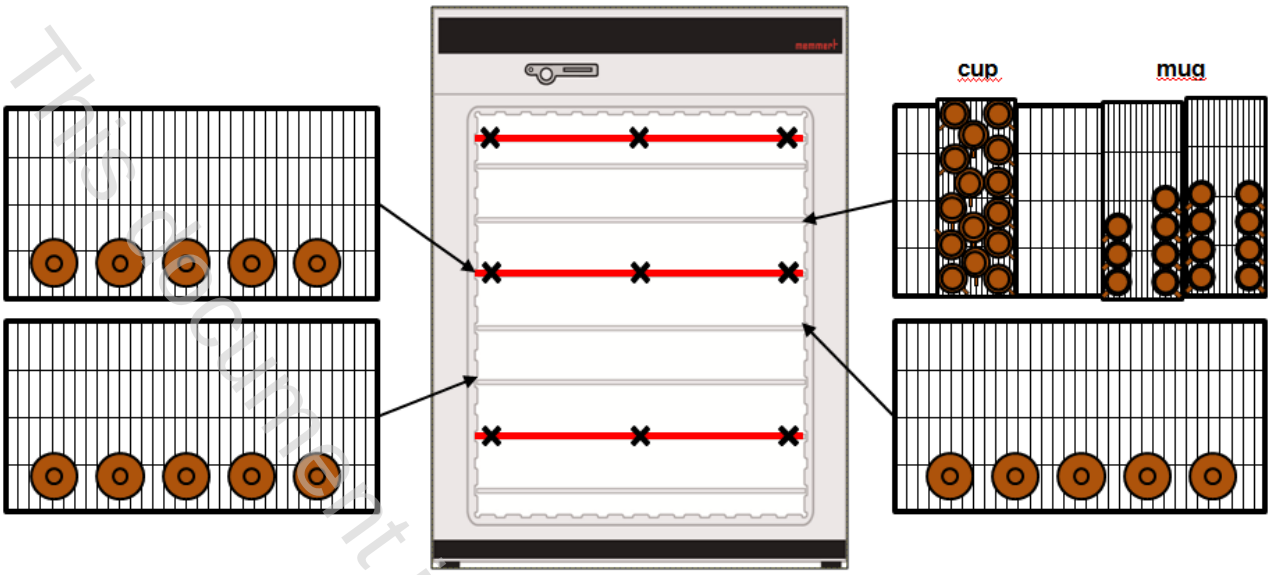
6.4.3.3 Application

Delete *Note 1.*

Modify *numbering of 'Note 2' to 'Note 1'.*

6.4.3.4 Pre-drying for oven drying method

Replace *Figure 2 by following:*



6.4.3.5 Pre-drying for air drying method

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, this subclause is not applicable."

6.4.4 Minced meat

6.4.4.1 General

Add *the following sentence after the third sentence of second paragraph:*

"One pass through the grinder is specified."

6.4.4.2 Preparation and storage

Modify *as follows:*

"Mix 50 g of whisked whole egg (see 6.4.5) to every 150 g minced meat (see 6.4.4). Mix well and divide into 20 g or multiple of 20 g portions. Store the portions in watertight containers and **freeze.** Before use, allow to defrost to ambient temperature and mix with water (see 5.6 for specification) at a ratio of 20 g to 6 g of water, until the minced meat mixture is homogeneous."

6.4.4.3 Application

Modify *the text of 6.4.4.3 as follows:*

Items to be soiled:

Soil the oval platter, the glass bowl and the oven pot with minced meat mixture.

Quantity of soil:

8 g of minced meat mixture for the oval platter, 8 g for the glass bowl and 6 g for the oven pot.

Method of soiling:

Refer to 6.4.1 and use a plastic fork as an application tool.

- Oval platter:

Apply the minced meat mixture evenly to the upper surface of the platter and ensure that a space of 20 mm around the edge is left clean.

- Glass bowl:

  Apply the minced meat mixture to the bottom and inner sides and ensure that a space of 40 mm around the edge is left clean.

- Oven pot:

  Apply the minced meat mixture on the bottom and the inner sides of the oven pot and ensure that a space of 10 mm around the edge is left clean.

6.4.6 Oat flakes

6.4.6.1 General

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, oat flakes as described in Annex L shall be used."

6.4.6.2 Preparation

Modify *the second sentence as follows:*

"Prepare porridge by bringing the mixture to the boiling point and allow to simmer for 10 min, stirring continuously from the very beginning of heating, using for example a wooden spoon."

6.4.6.3 Application

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, the use of alternate load items is not permitted."

6.4.7 Spinach

6.4.7.1 General

Add *the following paragraph after the note:*

"For energy labelling and ecodesign purposes, spinach as described in Annex L shall be used."

6.4.7.2 Preparation and storage

Add *the following paragraphs before the last paragraph and before Note 2 of this subclause:*

"After mincing, the spinach may be freeze-dried using lyophilisation and stored until use. By using lyophilisation the water content of the spinach is extracted and only 6 to 8 % of the original weight will remain as dry matter spinach. This dry matter spinach may be stored for up to 12 months provided it is air-tight and kept in the dark. Once the container has been opened, the remaining dry matter spinach may be used for four weeks provided it is stored in a re-sealed container in the dark.

For reconstitution of the quantities of minced spinach needed, an appropriate amount of this dry matter spinach is taken and distilled water is added. Follow the supplier's (e.g. Annex L.1.11) instruction when reconstituting the spinach for a test. After reconstituting the spinach shall be handled and stored like the de-frosted and ground spinach.

Freeze dried spinach from listed suppliers (refer to Annex L) has been proven to result in equivalent test results compared to using frozen spinach. Alternative sources shall prove equivalency through testing. Refer to L.2 for guidance on equivalency."

6.5 Drying of the soiled tableware items

6.5.2 Oven drying method

Add *the following sentence at the end of the last paragraph:*

"Following subclause 5.1.1 this requires soils prepared at the same time from the same batch for **reference** and **test machine**."

Add *the following notes after the last paragraph:*

"NOTE Z1 The opaque plastic cover is used to limit air circulation and avoid dust particles falling on the stored tableware items.

NOTE Z2 If tableware items are stored in the baskets of a dishwasher, these baskets should remain outside the opened dishwasher."

6.5.3 Air drying method

Add *the following paragraph after the last paragraph:*

"For energy labelling and ecodesign purposes, this subclause is not applicable."

6.6 Loading and operating

6.6.2 Operating

Modify *the first paragraph as follows:*

"During the performance tests the starting of the machines may have to be staggered to ensure there is enough time for a single assessor to assess the performance of each machine at the prescribed time after its ~~cycle~~ **programme** finishes. However, **test machines** shall run at the same time as part of the **reference machine** ~~cycle~~ **programme**."

Replace *the second sentence of the fifth paragraph by the following:*

"The index for cleaning is calculated at the number of test runs in the test series in which the value of ln W_C is satisfied. The index for drying is calculated at the number of test runs in the test series in which the value of ln W_D is satisfied. These respective numbers of test runs in the test series may be different."

Modify *the eighth paragraph as follows:*

"At the completion of the test ~~cycle~~ **programme**, the door shall be left undisturbed until commencing the evaluation procedure according to 7.2.2."