

INTERNATIONAL STANDARD



AMENDMENT 1

Electric dishwashers for household use – Methods for measuring the performance

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IEC 60436:2004/A1:2009

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FOREWORD

This amendment has been prepared by subcommittee 59A: Electric dishwashers, of IEC technical committee 59: Performance of household and similar electrical appliances.

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

CDV	Report on voting
59A/138/CDV	59A/139/RVC

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

The committee has decided that the contents of this amendment and the base publication 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- withdrawn,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.

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 publication using a colour printer.

5.1 General

Replace the last sentence in the second paragraph by the following:

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

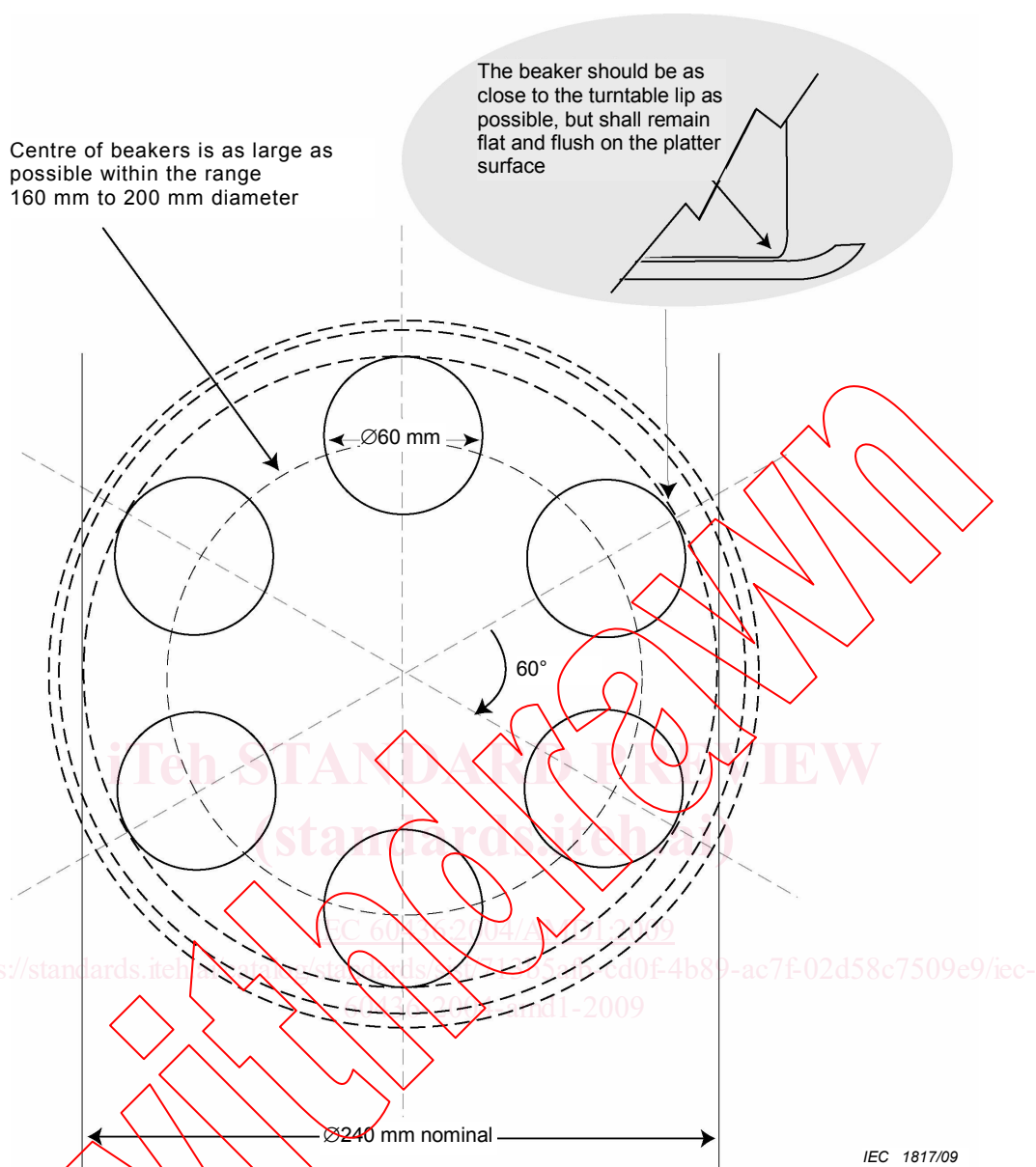
6.1 General and purpose

Replace the first sentence in the second paragraph by the following:

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

Figure 1 – Position of the glasses on the microwave turntable

Replace the existing Figure 1 by the following:



Annex E – Description of the reference machine

Modify the title of Annex E as follows:

“Description of the reference machine [Type 1]”

Add the following note just after the title:

NOTE The new reference machine [Type 2] with similar performance values is described in Annex N.

Annex G – Microwave oven and through-circulation thermal cabinet

G.1 Microwave oven

Replace the first sentence between brackets by the following:

Examples of products that comply with this specification are BOSCH HMT 742 C and BOSCH 752 F.

Add the following new Annex N:

Annex N (normative)

Description of the reference machine [Type 2]

NOTE The old reference machine [Type 1] with similar performance values is described in Annex E.

N.1 Specification of the reference machine

NOTE 1 A suitable reference machine that complies with the requirements of Clause N.1 is the Miele G 1222 SC Reference (Writing on faceplate: Miele G Reference) that has been specially prepared for use as a reference machine by Miele. A complying reference machine can be obtained from the supplier as specified in Clause F.16.

"Miele" is a trademark. This information is provided for the convenience of users of this international standard and does not constitute an endorsement by the IEC of this trademark. Items of the similar specification may be used if they can be shown to lead to equivalent results.

General specifications and performance requirements:

- rated voltage 230 V a.c., rated frequency 50 Hz (refer to N.2);
- rinse aid dosage: setting 3.

Specifications of the reference programme (name of the programme on the faceplate of the reference machine "Reference EN/IEC") using a clean load with no detergent:

- spray arm rotations per min:

top:	41 ± 9	(refer to N.3.2)
middle:	24 ± 4	
bottom:	35 ± 5	
- water hardness of sump water in the 2 heated rinses [mmol/l]: ≤ 0,5 (refer to N.3.3)
- water consumption [litres]:

14,4 ± 0,4	(refer to N.3.4)
(with regeneration of the softener) [litres]:	16,9 ± 0,5
- energy consumption [kWh]: 1,33 ± 0,08 (refer to N.3.4)
- water level measured in the sump at the end of the programme (refer to N.3.5)
- maximum water temperatures measured in the sump [°C]:
 - cleaning operation: 50 ± 2 (refer to N.3.6)
 - heated rinse operations: 67 ± 2 (refer to N.3.7)
- programme time [min]: 99 ± 4 (refer to N.3.8)

NOTE 2 As the new reference machine has no fan action after the end of the programme (as the old one), here programme time and cycle time are identical.

Specifications of the reference programme (name of the programme on the faceplate of the reference machine "Reference EN/IEC") when tested in accordance with Clause 6 (soiled load) using 5 g + 20 g (pre-wash + main wash) detergent B:

- cleaning performance – oven drying method (refer to 6.5.1):

average values	3,55 ± 0,20	(refer to N.3.8)
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NOTE 3 Single values may scatter by ±0,15 around average values.

- cleaning performance – air drying method (refer to 6.5.2):

	4,02 ± 0,20	(refer to N.3.8)
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NOTE 4 Range for cleaning index for the reference machine using detergent C is under consideration. Further information may be available from the supplier of the reference detergent – see Annex F.

Specifications of the reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) when tested in accordance with Clause 7 (clean load) using 5 g + 20 g (pre-wash + main wash) detergent B:

– drying efficiency: $0,81 \pm 0,09$ (refer to N.3.9).

Details on verifying the performance of the reference machine are set out in Clause N.3.

N.2 Installation and use of the reference machine

The manufacturer of the reference machine shall specially measure and check each individual reference machine prior to supplying it.

For installation of the reference machine:

- check that the hoses are not bent. The height of the drain hose (measured from the bottom of the machine to the highest point of the hose) shall be: $60 \text{ cm} \pm 10 \text{ cm}$;
- the reference machine is always installed as a free standing type, irrespective of the type of test machine(s);
- the supply voltage and frequency of the reference machine shall be $230 \text{ V} \pm 1 \%$ and $50 \text{ Hz} \pm 1 \%$, irrespective of the voltage and frequency of the test machine(s);
- the reference machine always uses a load style from Annex A, irrespective of the load style used on the test machine(s).

N.3 Calibration of the reference machine

N.3.1 General

Before starting a series of tests, a calibration check of the reference machine shall be undertaken. To perform a calibration check on the reference dishwasher, the following measurements or observations shall be made and compared with the specifications and requirements given in Clause N.1. If the machine does not comply with the specified requirements, the test conditions, equipment and procedure shall be checked and the measurements repeated as appropriate. If there are no apparent faults but the reference machine still does not meet the specifications, contact the manufacturer to get this rectified.

Prior to performing calibration checks, ensure that all filters have been cleaned and that spray arm jets are free from any blockages. It is recommended that calibration checks be undertaken in the following order.

NOTE The checks on the reference machine specified in Clause N.3.2 to Clause N.3.7 can be verified with a single cycle with a clean load and without detergent. Tasks specified in Clauses N.3.8 and N.3.9 are verified over 5 cycles.

N.3.2 Checking spray arm rotations

A service viewing window and associated key shall be used with the reference machine to facilitate the performance of calibration checks of spray arm rotations. Spray arm rotations may be determined on any programme on the reference machine with a clean load installed and no detergent. If the spray arm requirements specified in Clause N.1 are not met, remedial action shall be taken, e.g. contact manufacturer.

N.3.3 Checking the water hardness

When the reference machine is run on reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) with a clean load installed and no detergent, the values specified in Clause N.1 shall be achieved. The hardness is to be within the prescribed range.

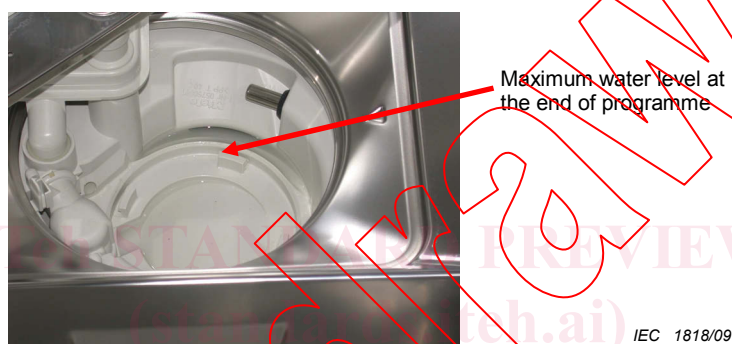
N.3.4 Checking the energy and water consumption

When the reference machine is run on reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) and in accordance with Clause 6, except with a clean load at room temperature and no detergent, the total energy consumption and water consumption values specified in Clause N.1 shall be achieved.

In each 5th cycle a regeneration operation occurs, respectively the water softener is rinsed out.

N.3.5 Checking the water level in the sump

The water level left in the sump is used as an indicator of the drain pump performance. The water level shall be measured at the completion of a cycle by removing the sieve. There is no adjustment for this parameter—a machine that operates outside the specified range will require servicing.



N.3.6 Checking the water temperature in the sump

The water temperature in the sump is used as an indicator of temperature control performance of the heating system in the reference machine. The water temperature shall be measured on the reference programme during the heated wash operation and the heated rinse operations by means of a temperature sensor installed in the central hole of the sump (to prevent any bending of sieves). The temperature sensor shall be fully immersed. The temperature during each heating operation should be logged at regular intervals to verify compliance with Clause N.1.

N.3.7 Checking the programme time

When the reference machine is run on reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) and in accordance with Clause 6, except with a clean load at room temperature and no detergent, the program time specified in Clause N.1 shall be achieved.

N.3.8 Checking the cleaning performance

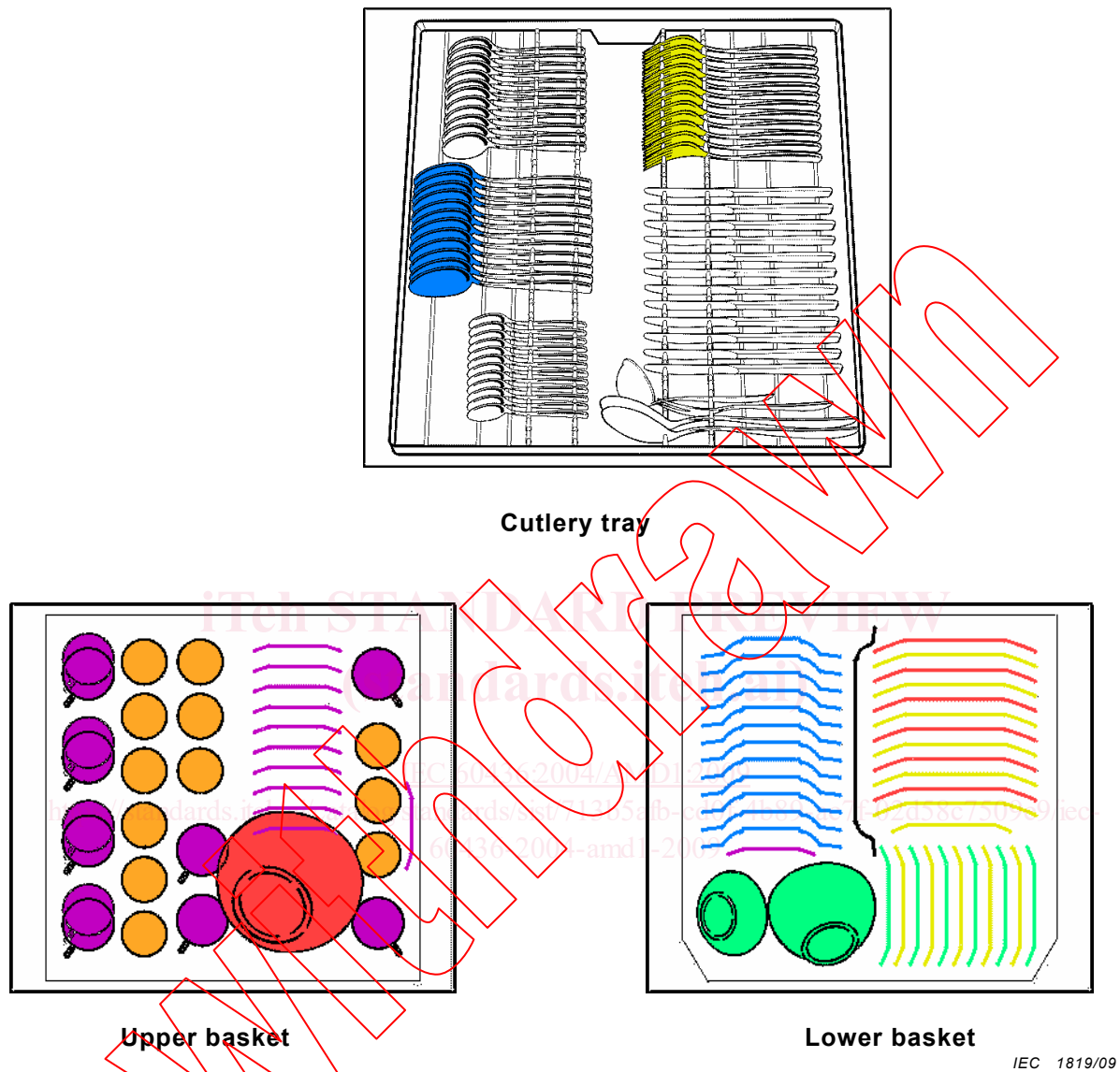
When the reference machine is run on reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) and in accordance with Clause 6 (i.e. with a soiled load and detergent) and the loading plan in Clause N.4, the values specified in Clause N.1 shall be achieved (average value based on 5 runs).

N.3.9 Checking the drying performance

When the reference machine is run on reference programme (name of the programme on the faceplate of the reference machine “Reference EN/IEC”) and in accordance with Clause 7 (i.e. with a clean load and with detergent) and the loading plan in Clause N.4, the values specified in Clause N.1 shall be achieved (average value based on 5 runs).

N.4 Reference machine loading plan

The reference machine shall be loaded as indicated in the following plans for each basket:



Key

Soil: Colour
 milk: orange
 tea: violet
 minced meat: red
 egg: yellow
 oat flakes: blue
 spinach: green
 margarine: black

Figure N.1 – Reference machine [Type 2] loading plan

Withdrawing

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