

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise –  
Part 2-3: Particular requirements for dishwashers

Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien –  
Partie 2-3: Exigences particulières pour les lave-vaisselle



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – TEST CODE  
FOR THE DETERMINATION OF AIRBORNE ACOUSTICAL NOISE –****Part 2-3: Particular requirements for dishwashers**

## FOREWORD

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International Standard IEC 60704-2-3 has been prepared by subcommittee 59A: Electric dishwashers, of IEC technical committee 59: Performance of household and similar electrical appliances.

This third edition cancels and replaces the second edition published in 2001 and Amendment 1:2005. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) it doesn't contain the description of an appropriate test enclosure because the test enclosure has been incorporated in IEC 60704-1:2010, Annex B;
- b) the values of standard deviations of sound power levels determined according to this part are given in Clause 1;

- c) to prevent an appliance being programmed to recognize the test cycles, and reacting specifically to them, in this new edition an artificial soil is used in addition to the unsoiled load and the rinse aid container has to be filled. This artificial soil successive may build up a film on the load. Therefore, detergent also has to be used. An initial test has shown that no foam is to be expected.

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

FDIS	Report on voting
59A/212/FDIS	59A/214/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 2-3 is intended to be used in conjunction with the third edition (2010) of IEC 60704-1, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*.

NOTE When "Part 1" is mentioned in this standard, it refers to IEC 60704-1.

The relevant text of Part 1 as amended by this standard establishes the test code for dishwashers.

This Part 2-3 supplements or modifies the corresponding clauses in IEC 60704-1, so as to establish the test code for dishwashers. When a particular subclause of Part 1 is not mentioned in this Part 2-3, that subclause is applicable as far as reasonable. Where this standard states "addition", "modification" or "replacement", the relevant requirements, test specifications or explanatory matter in Part 1 should be adapted accordingly.

Subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1.

Unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause.

Additional annexes are lettered AA, BB, etc.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

## INTRODUCTION

The measuring conditions specified in this Part 2-3 provide for sufficient accuracy in determining the noise emitted and comparing the results of measurements taken by different laboratories, whilst simulating as far as possible the practical use of dishwashers.

It is recommended to consider the determination of noise levels as part of a comprehensive testing procedure covering many aspects of properties and performance of household dishwashers.

NOTE As stated in the Introduction to IEC 60704-1:2010, this test code concerns airborne noise only.

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# HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – TEST CODE FOR THE DETERMINATION OF AIRBORNE ACOUSTICAL NOISE –

## Part 2-3: Particular requirements for dishwashers

### 1 Scope

This clause of Part 1 is applicable except as follows.

#### 1.1 Scope

##### 1.1.1 General

*Addition:*

These particular requirements apply to single unit electric dishwashers for household and similar use, with or without automatic programme control, for cold and/or warm water supply, for detachable or permanent connection to water supply or sewage systems, intended for placing on the floor against a wall, for building-in or placing under a counter, a kitchen worktop or under a sink, for wall-mounting or on a counter.

##### 1.1.2 Types of noise

*Replacement:*

The methods specified in ISO 3743-1, ISO 3743-2 and ISO 3744 can be used for measuring noise emitted by electric dishwashers.

##### 1.1.3 Size of source

*Replacement:*

The method specified in ISO 3744 is applicable to noise sources of any size. When applying ISO 3743-1 and ISO 3743-2, care should be taken that the maximum size of the appliance under test fulfils the requirements specified in 1.2 of ISO 3743-1:2010 and 1.3 of ISO 3743-2:1994.

### 1.2 Object

*Addition:*

Requirements for the declaration of noise emission values are not within the scope of this document.

NOTE 101 For determining and verifying noise emission values declared in product specifications, see IEC 60704-3.

### 1.3 Measurement uncertainty

*Replacement:*

The estimated values of standard deviations of sound power levels determined according to this document are given in Table 101:



**Table 101 – Standard deviations of sound power levels**

Standard deviation (dB)	
$\sigma_r$ (repeatability)	$\sigma_R$ (reproducibility)
0,5	0,8

*Addition:*

### 1.101 Standard deviation for declaration and verification

For the purpose of determining and verifying declared noise emission values according to IEC 60704-3, the values in Table 102 apply:

**Table 102 – Standard deviations for declaration and verification**

Standard deviation (dB)		
$\sigma_P$ (production)	$\sigma_t$ (total)	$\sigma_M$ (reference)
1,0 to 1,5	1,3 to 1,7	2,0

## 2 Normative references

This clause of Part 1 is applicable except as follows:

*Replacement:*

[IEC 60704-2-3:2017](#)

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ISO 3743-1:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for small movable sources in reverberant fields – Part 1: Comparison method for a hard-walled test room*

ISO 3744:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

*Addition:*

IEC 60436:2015, *Electric dishwashers for household use – Methods for measuring the performance*

## 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

### 3.3 operational cycle

*Addition:*

starts with the initiation of the programme (excluding any user programmed delay) and ends when all activity ceases (i.e. the end of the cycle); at the end of the cycle, all activity in the dishwasher has ceased, i.e. the dishwasher may revert to off mode or it may have a steady state power consumption until the user opens the dishwasher or turns the unit off

Note 1 to entry: Audible program end signals should be switched off or set to the lowest configuration. If this is not possible the audible signals shall be included in the measurement.

### 3.101

#### rated dishwasher capacity

whole number of place settings together with the serving pieces which can be cleaned and dried in one cycle when loaded in accordance with the manufacturer's instructions

Note 1 to entry: The rated dishwasher capacity is declared by the manufacturer and expressed as a number of place settings.

[SOURCE: IEC 60436:2015, 3.1.12]

### 3.102

#### place setting and service pieces

tableware and pieces as defined in the dishwasher performance standard IEC 60436

### 3.103

#### drying

operational period during which the load is dried; drying begins when the washing pump has stopped after final rinse and ends with the end of the operational cycle

## 4 Measurement methods and acoustical environment

This clause of Part 1 is applicable except as follows.

### 4.2 Direct method

*Addition:*

[IEC 60704-2-3:2017](#)

If pure tone components are present in the noise emitted by the source, the estimated standard deviation of the measured sound pressure levels in the special reverberation room can increase. In such cases, additional microphone positions or source positions can be necessary, as specified in ISO 3743-2.

### 4.3 Comparison method

*Addition:*

If pure tone components are present in the noise emitted by the source, the estimated standard deviation of the measured sound pressure levels in the hard-walled test room or in the special reverberation room can increase. In such cases, additional microphone positions or source positions may be necessary, as specified in ISO 3743-1 or ISO 3743-2.

## 5 Instrumentation

This clause of Part 1 is applicable.

## 6 Operation and location of appliance under test

This clause of Part 1 is applicable except as follows.

### 6.1 Equipping and pre-conditioning of appliances

#### 6.1.3

*Replacement:*

Prior to commencing measurements, the inner surfaces of the appliance and filters shall be clean. The salt container, if included, shall be filled with water and salt according to manufacturer's instructions. The rinse aid container, if included, shall be filled with rinse aid. The quantity settings for the salt and the acidic rinse aid (Formula III) to be used are defined in 5.8 and 5.9 of IEC 60436:2015. Then the appliance shall be run for at least two operational cycles as defined by the manufacturer for the first runs in households. Specifications that are given specially for the use of test laboratories shall be ignored. If there are no running-in cycles specified by the manufacturer, the appliance shall be operated as defined in 6.101, with or without load, but without soil. At first the cycles shall be done with detergent as specified in 6.4.2.

#### 6.1.4

*Replacement:*

Before the noise test, the appliance shall not have been out of operation for an extended period of time. Otherwise, one more operational cycle shall be run according to the manufacturer's instructions for reconnection or as defined in 6.101, with or without load, but without soil.

### 6.2 Supply of electric energy and of water or gas

#### 6.2.2

*Not applicable.*

#### 6.2.3

*Not applicable.*

#### 6.2.4

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*Replacement:*

Dishwashers designed for either cold or hot water supply shall be supplied with cold water.

The water hardness may be neglected. For noise measurements, the static water pressure during filling shall be  $(240 \pm 50)$  kPa, if not contradictory to the manufacturer's instructions. The temperature of cold water shall be  $(15 \pm 5)$  °C and the temperature of hot water shall be  $(55 \pm 5)$  °C.

NOTE 101 If regeneration occurs during sound measurement, the measurement remains valid. When, in some countries, the water supply pressure and/or temperature differs from the water supply pressure and/or temperature of the country concerned, measurements carried out at rated pressure and/or temperature can be misleading for the consumer. In this case, additional measurements can be necessary. If the test pressure and/or temperature differ from the rated pressure and temperature, this should be recorded.

### 6.4 Loading and operating of appliances during tests

#### 6.4.2

*Replacement:*

The appliance under test shall be at room temperature when the test programme starts.

Dishwashers shall be operated in the standard test programme according to 6.101, with a standard test load according to 6.102. Depending on the declared number of place settings (and artificial soil), a different amount of detergent should be used: 5 g for 1 to 3 place settings, 10 g for 4 to 7 place settings, 15 g for 8 to 10 place settings and 20 g for more than 10 place settings. Detergent D according to IEC 60436 shall be used.

The detergent shall be placed in the dishwasher immediately prior to starting the programme in the locations specified by the manufacturer. If a dispenser is fitted, some or the entire detergent dose shall be placed in it according to the manufacturer's instructions. The dispenser shall be clean and dry prior to the placement of detergent. In the absence of manufacturer recommendations, the detergent shall be placed in the main compartment of the dispenser.

The standard test load shall be dry and at room temperature when the standard test programme starts. The glass with artificial soil shall be removed from the freezer and placed in the dishwasher within 2 min before the standard test programme starts.

Follow the supplied loading plan of the manufacturer. If no loading plan is available or if the loading plan does not describe the placement of the glass, load the glass with frozen milk in the upper basket at a position that injection water from a nozzle passes through the glass. If there is no upper basket in a machine, or the glass cannot be put on the upper basket, load the glass in lower basket at a position that injection water from a nozzle passes through the glass.

Care shall be taken to prevent avoidable noise by rattling of tableware through collision by water jets or spray arms.

NOTE 101 Normally, a three-hour break with the door open is sufficient to cool down the appliance after an operational cycle.

## 6.5 Location and mounting of appliances

### 6.5.2

*Not applicable.*

### 6.5.5

<https://standards.iteh.ai/catalog/standards/sist/4054db13-a551-4940-9ef9-73c76eaab222/iec-60704-2-3-2017>

*Addition:*

Appliances with an irremovable worktop and appliances specified by the manufacturer for free-standing use only shall be measured free-standing. All other appliances shall be placed in a test enclosure, as described in Annex B of IEC 60704-1:2010, and the worktop – if any – shall be removed.

The front edge of the housing of the dishwashers designed to be built-in (except door) shall be 20 mm to 25 mm behind the front edge of the test enclosure.

If there's no skirting board integrated and the position of the skirting board is not specified by the manufacturer the skirting board shall be pressed against the appliance.

### 6.101 Standard test programme for noise measurements

The standard test programme for noise measurements is the same programme as used for measuring the cleaning performance, the drying performance, and energy and water consumption, according to IEC 60436.

### 6.102 Standard test load for noise measurements

The standard test load for noise measurements is the load according to IEC 60436. It consists of the whole number of complete place settings plus the corresponding serving pieces, which together comprise the manufacturer's rated dishwasher capacity. The standard test load includes one glass filled with frozen artificial soil. Apart from this glass, the standard test load shall be unsoiled. The artificial soil shall be prepared from UHT (ultra-heat treated) milk with a fat content of 3,5 % ± 0,5 %.