IEC 60704-2-15

Edition 1.0 2024-09

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-15: Particular requirements for household food waste disposers

IEC 60704-2-15:2024-09(en)

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FOREWORD

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IEC 60704-2-15 has been prepared by IEC subcommittee 59L: Small household appliances, of IEC technical committee 59: Performance of household and similar electrical appliances. It is an International Standard.

This first edition cancels and replaces the first edition of IEC/PAS 60704-2-15, published in 2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC/PAS 60704-2-15:2008:

a) measurement uncertainty and standard deviations have been reviewed;
b) definitions of standard test programme and standard test load have been reviewed;
c) definition of the test enclosure has been reviewed;

d) additional microphone position for test in free field environment;

e) information to be reported has been reviewed;

f) aligned to IEC 60704-1:2021.

The text of this International Standard is based on the following documents:

Draft	Report on voting
59L/252/CDV	59L/264/RVC

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 International Standard 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/publications.

This Part 2-15 is intended to be used in conjunction with the fourth edition of IEC 60704-1:2021, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*.

The relevant text of IEC 60704-1:2021 as amended by this publication establishes the test code for household food waste disposers.

This document supplements or modifies the corresponding clauses in IEC 60704-1:2021. When a particular subclause of IEC 60704-1:2021 is not mentioned in this document, 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 IEC 60704-1:2021 are to be adapted accordingly.

Subclauses, tables and figures that are additional to those in IEC 60704-1:2021 are numbered starting from 101. Additional annexes are lettered AA, BB, etc.

Unless notes are in a new subclause or involve notes in IEC 60704-1:2021, they are numbered starting from 101, including those in a replaced clause or subclause.

In this standard, the following print types are used:

- terms defined in Clause 3: **bold type**.

A list of all parts in the IEC 60704 series, published under the general title *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn, or
- revised.

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INTRODUCTION

The noise of food waste disposers has been measured up to now by making use of IEC/PAS 60704-2-15[1].

The measuring conditions specified in this document 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 food waste disposers.

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

NOTE As stated in the introduction to IEC 60704-1:2021, this test code is concerned with airborne noise only.

[1] This publication has been withdrawn.

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

Part 2-15: Particular requirements for household food waste disposers

1 Scope

Replacement:

These particular requirements apply to single unit electric food waste disposers for household use, with or without automatic programme control, for cold water supply, for permanent connection to water supply and sewage systems, intended for connection to the kitchen sink drain and contained within a kitchen cabinet enclosure.

Food waste disposers for restaurants, hotels and industry purposes are excluded.

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

2 Normative references

Addition:

ANSI/ASME A112.19.3-2022, *Stainless Steel Plumbing Fixtures*

3 Terms and definitions

Addition:

3.101
batch feed operation
method of operation in which the operator loads the food waste into the container body

3.102
standard hard test load
rigid standard test load for noise measurements

4 Measurement methods and acoustical environment

4.1 General

Addition after the second paragraph:

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

4.2 Direct method

Addition:

If pure tone components are present in the noise emitted, proper precautions shall be taken as specified in ISO 3743-2.

4.3 Comparison method

Addition:

If pure tone components are present in the noise emitted, proper precautions shall be taken as specified in ISO 3743-1 and ISO 3743-2.

4.4 Acoustical environments

4.4.1 General requirements and criterion for adequacy of the test environment

Replace the third paragraph with the following:

The method specified in ISO 3744 is applicable to noise sources of any size. When applying ISO 3743-1 and ISO 3743-2, it shall be ensured that the maximum size of the cabinet enclosing the food waste disposer under test fulfils the requirements specified in ISO 3743-1:2010, 4.2, and ISO 3743-2:2018, Clause 5.

4.5 Measurement uncertainties

4.5.2 Standard deviations on repeatability and reproducibility and standard deviations related to declaration and verification

Replacement:

The estimated values of standard deviations of sound power levels determined in accordance with this document are currently not available.

For the purpose of determining and verifying declared noise emission values for food waste disposers in accordance with IEC 60704-3, the value σ_M is 2,5 dB.

6 Operation and location of appliances under test

6.1.3 *Replacement*:

Prior to commencing measurements, the inside of the grind chamber shall be clean and free of any debris from prior operation. The food waste disposer shall be run through 10 complete operational cycles, of a 30 s duration, with a **standard hard test load** (3.102).

6.1.4 Not applicable.

6.2 Supply of electric energy and of water or gas

6.2.1 *Replacement*:

The supply voltage is measured at the plug of a non-detachable cable or cord, at the appliance inlet if a detachable cord is provided or no cable is provided, but in no case at the entrance of extensions cables or cords.

6.2.2 Not applicable.

6.2.3 Not applicable.

6.2.4 *Replacement*:

The temperature of the supply water shall be between 4 °C and 27 °C.

The flow rate of the water supply shall be 6 l/min ± 0,3 l/min. The water faucet shall be positioned in such a way that the water flows down the side of the sink into the drain, creating negligible water splash noise.

6.4 Loading and operating of appliances during tests

6.4.2 *Replacement:*

In **batch feed operation** the food waste is loaded in the container body (see Figure 101) prior to starting the water flow and then the operational cycle of the disposer.

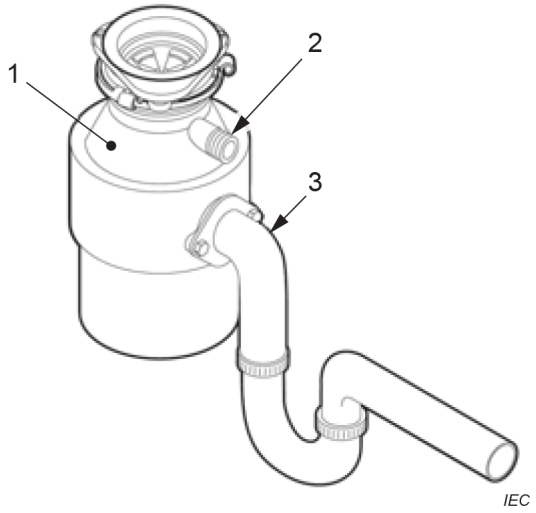
The **standard hard test load** consists of fifteen (15) 12,7 mm (0,5 in) diameter nylon 6/6 solid balls. This grind media shall be conditioned by soaking in water for seven days prior to use.

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

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

The appliance shall be operated according to 3.101 using the test load as described in 3.102. If an operator has to be present to place the test load in the grind chamber and to start and stop the operational cycle of the disposer, the operator's position shall be chosen to minimize the influence upon the acoustic measurement and shall be consistent for all tests. A switch may be used to start and stop the operational cycle and minimize the influence of the operator on the measurements.

Upon completion of the measurements, the remaining material in the grind chamber is to be removed and the disposer flushed with water to ensure no material remains. An auditory check shall be made of the unit running without any water or load to ensure that no material remains in the grind chamber. Ensure that no test load remains on the top lip of the grind chamber.



Key:

1 container body (grind chamber)

2 dishwasher inlet

3 discharge (to the sewer lines)

Figure 101 – Food waste disposer

6.5 Location and mounting of appliances

6.5.2 Not applicable.

6.5.3 Not applicable.

6.5.4 *Replacement:*

For measurements on floor-standing appliances intended for placing against a wall (including cabinets, counters, or **test enclosure**s for building in or under counter types), a vertical reflecting plane shall be available.

When the measurements are made in a hard-walled test room or in a special reverberation test room, a part of a wall of the room will serve for this purpose. The minimum area of this part of the wall should be determined by the projection of the appliance, extended by at least 0,5 m upwards and to both sides. The minimum distance between any surface of the appliance (cabinet, counter, or **test enclosure**) and the nearest corner of the room shall be 1 m.

When measurements are made in a free-field environment, a vertical-reflecting plane (supported by the horizontal reflecting plane) shall be provided. The minimum size of this vertical plane shall be at least equal to the size of the projection of the measurement surface.

For both types of test environments, the requirements given below shall be followed:

- the acoustic absorption coefficient of the vertical reflecting plane shall be less than 0,06;
- the appliance shall be placed in the test environment without any resilient means other than those incorporated in the appliance;
- care should be taken to avoid any direct contact between the appliance (including protruding parts, worktops, spacers, etc.) and the vertical reflecting plane;
- the distance between the vertical reflecting plane and the appliance shall be established by placing the appliance in direct contact with the vertical reflecting plane and then moving it away a distance of 10 cm ± 1 cm.

6.5.5 Not applicable.

6.5.6 *Replacement:*

The food waste disposer manufacturer's instructions regarding installation and use of the disposer shall be followed.

The test cabinet shall be constructed as shown in Figure 102. Details of a recommended design are shown in Annex B, Figure B.1, Figure B.2 and Figure B.3.

A standard 19 mm thick particle board countertop shall be rigidly mounted to the top of the cabinet. A 838 mm × 540 mm × 167 mm (33 in × 21,25 in × 6,57 in), 20 gauge, double bowl stainless steel sink conforming to ANSI/ASME A112. 19.3-2022 shall be installed in the countertop as specified by the sink manufacturer's instructions. The bowl dimensions shall be 356 mm × 400 mm × 167 mm (14 in × 15,75 in × 6,57 in). The drain holes shall be centred within each bowl. The (0,5 in) copper tubing shall be deck mounted using the mounting holes provided in the sink and installed as specified by the detail drawing of recommended design in accordance with Annex B. Any damping pads on the underside of the sink bowls shall be removed.

NOTE Different pad type material or amounts will cause varying damping. Removing them leads to consistent results.

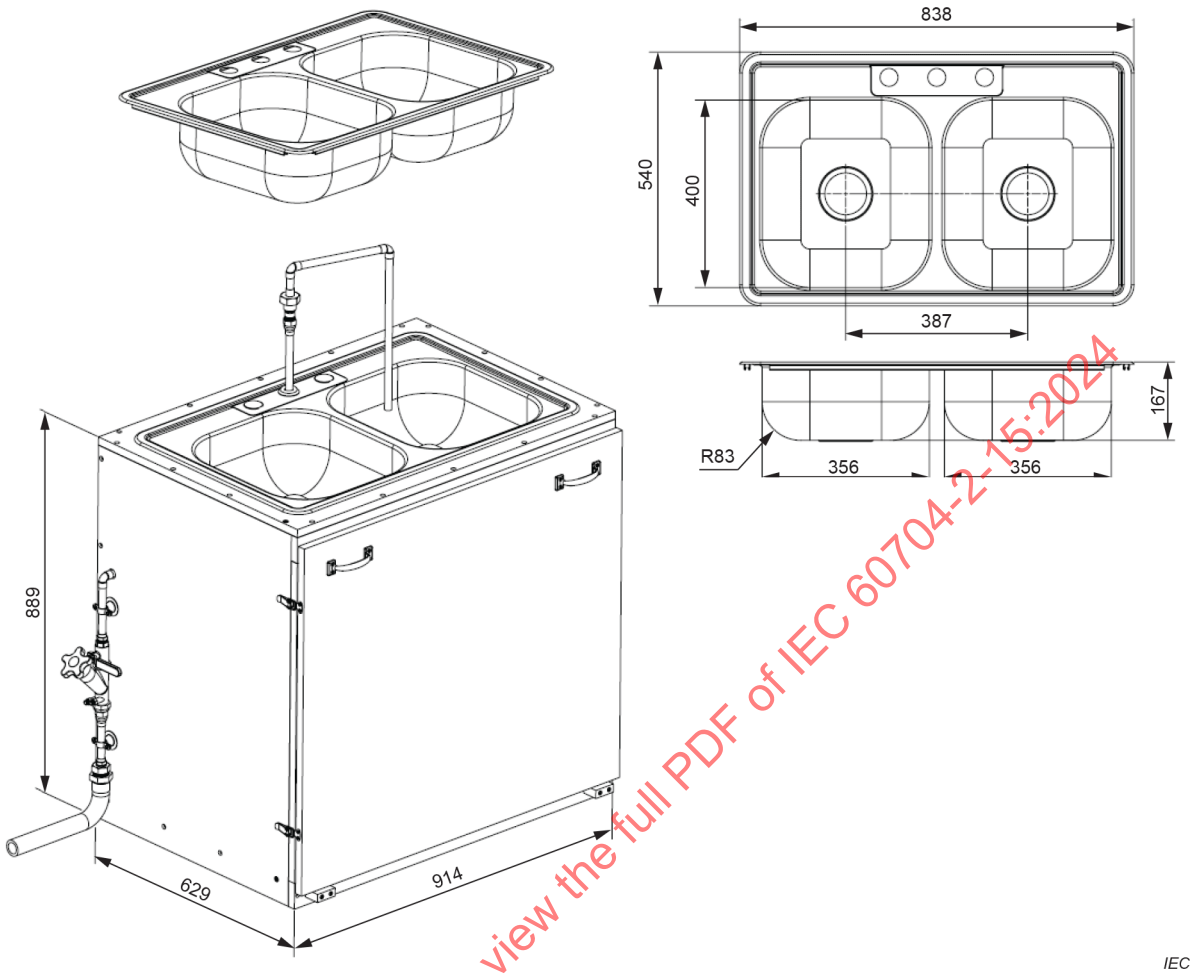
The sink shall be installed in the cabinet in accordance with the instructions of the sink manufacturer.

The food waste disposer shall be mounted in one bowl of the sink. Each sink bowl shall have an individual P-trap, connecting to a Y-fitting. The sewer or drain line shall be connected to the Y-fitting.

Cut-outs required for the services shall be at a minimum size and shut by sealing means to prevent noise leakage. Supply lines shall be properly isolated to prevent transmission of structure-borne noise.

The **test enclosure** with appliance is to be placed as specified in 6.5.4.

Dimensions in millimetres



Double bowl drop in sink, with centre drain placement, stainless steel 838 mm x 540 mm x 167 mm, 0,8 mm thick

The front panel shall be removable to access disposer plumbing.

NOTE Material: 19 mm thick untreated particle-board (chipboard) or untreated plywood, having a density between 600 kg/m^3 and 750 kg/m^3.

Figure 102 – Test enclosure – Mandatory characteristics drawing

7 Measurement of sound pressure levels

7.1 Microphone array, measurement surface, and RSS location for essentially free-field conditions over reflecting plane(s)

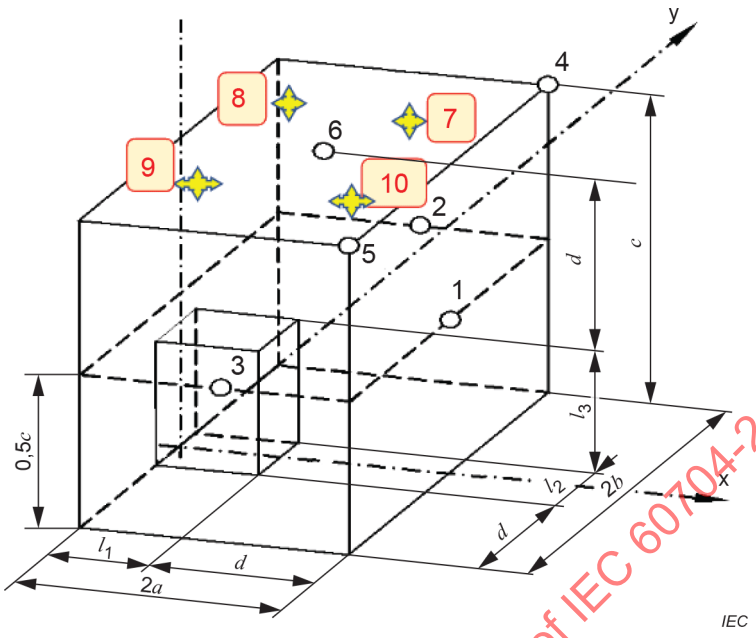
7.1.2 Not applicable.

7.1.3 *Addition:*

All food waste disposers exhibit a dominant noise transfer path from the open grind chamber and baffle to the top surfaces of the sink and cabinet. The need for any additional microphone positions in this test is driven by ISO 3744:2010, 8.1.2, to better evaluate conditions of localized noise sources where assigning too large an area to an individual key microphone position will not accurately represent the unit under test.

The additional microphones may be added at the four quadrant centres of the surface plane requiring improved spatial coverage according to ISO 3744:2010, Figure C.3.

The microphone array of six key microphones (#1 to #6) plus four optional microphones (#7 to #10) on the top measurement plane is shown in Figure 103:



Key:

1 to 6 microphone positions according to IEC 60704-1:2021, 7.1.3

7 to 10 additional microphone positions with following coordinates:

No.	x	y	z
7	1,5·a	0,5·b	c
8	0,5·a	0,5·b	c
9	0,5·a	-0,5·b	c
10	1,5·a	-0,5·b	c

Figure 103 – Six-microphone geometric setup with four optional microphones on the top measurement plane

7.1.4 Not applicable.

7.1.5 Not applicable.

7.1.6 Not applicable.

7.1.7 Not applicable.

7.4 Measurements

7.4.1 *Addition:*

A 20 s measurement shall be taken that encompasses the start of the operational cycle.

The operational cycle begins with the start of the cycle by the operator and ends either when the operator turns off the disposer for manual operation or the disposer is turned off by a controller for automatic operation.

Three trials shall be conducted.

To obtain the final result, the logarithmic mean value is calculated. If, however, the difference between any two of the results exceeds 3 dB, three additional measurements shall be carried out, and the final result will be the logarithmic mean value of the six measurements. At least 5 min with cold water running through the disposer shall be allowed between trials to allow the food waste disposer to return to ambient conditions.

7.4.4 Not applicable.

8 Calculation of sound pressure and sound power levels

8.4 Calculation of sound pressure level averaged over the microphone positions

Addition:

The total average sound pressure level is subject to the calculation in ISO 3744:2010, 8.2.2.2, Equation (14), which averages each microphone position with a weighting function proportional to each microphone's represented area portion of the total measurement surface. In this case, microphones 1 to 5 each represent 1/6th of the total surface area, and microphones 6 to 10 each represent 1/30th of the total surface area (that being an evenly split 1/5th each of the 1/6th area assigned to the key microphone alone).

9 Information to be recorded

9.6 Equipment and pre-conditioning of appliance under test

9.6.2 Not applicable.

9.6.3 Not applicable.

9.7 Electric supply, water supply, etc.

9.7.2 Not applicable.

9.7.3 *Replacement:*

Water flow rate with tolerance.

9.7.4 Not applicable.

10 Information to be reported

10.3.3 Not applicable.

10.3.5 Not applicable.

Annex A
(normative)

Standard test table

This annex of IEC 60704-1:2021 is not applicable.