

Australian/New Zealand Standard™

**Household and similar electrical
appliances—Test code for the
determination of airborne acoustical
noise**

**Part 2.3: Particular requirements for
dishwashers**



AS/NZS 60704.2.3:2009

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-015, Quality and Performance of Household Electrical Appliances. It was approved on behalf of the Council of Standards Australia on 11 February 2009 and on behalf of the Council of Standards New Zealand on 23 February 2009. This Standard was published on 22 April 2009.

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Department of Water and Energy, NSW
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-015, Quality and Performance of Household Electrical Appliances.

The objective of this Standard is to define the methods of determination of airborne acoustical noise emitted by dishwashers. This Standard applies to single-unit electric dishwashers for household and similar use, with or without automatic program control, for cold and/or hot 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.

This Standard is identical with, and has been reproduced from IEC 60704-2-3, Ed. 2.1 (2005), *Household and similar electrical appliances—Test code for the determination of airborne acoustical noise—Part 2-3: Particular requirements for dishwashers*.

This Part 2.3 is intended to be used in conjunction with AS/NZS 60704.1, *Household and similar electrical appliances—Test code for the determination of airborne acoustical noise—Part 1: General requirements*.

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

This Part 2.3 supplements or modifies the corresponding clauses in AS/NZS 60704.1. When a particular clause of Part 1 is not mentioned in this Part 2, that clause 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.

Clauses or figures that are additional to those in Part 1 are numbered starting from 101. Additional annexes are lettered AA, BB, etc.

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- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) A full point should be substituted for a comma when referring to a decimal marker.

The terms ‘normative’ and ‘informative’ are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

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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.

To avoid unsteadiness caused by foaming, the tests are carried out with unsoiled loads and without detergents or rinsing aids.

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 dishwashers.

Compared to the first edition (1987) of this Part 2, the second edition additionally considers the noise of water supply, drainage, pre-wash and intermediate rinse. Therefore the operating conditions during these operations shall be observed carefully.

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

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Household and similar electrical appliances—Test code for the
determination of airborne acoustical noise
Part 2.3: Particular requirements for dishwashers**

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1 Scope**1.1.1 General**

Replacement:

These particular requirements apply to single-unit electric dishwashers for household and similar use, with or without automatic programme control, for cold and/or hot 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.

Limitations for the use of this test code are given in 1.1.1 of IEC 60704-1.

1.1.2 Types of noise

Replacement:

ISO 3743-1, ISO 3743-2 and ISO 3744 can be used for measuring noise emitted by dishwashers.

1.1.3 Size of the 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 dishwasher under test fulfils the requirements specified in 1.3 of ISO 3743-1 and ISO 3743-2.

1.2 Object

Addition:

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

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

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 60436:2004, *Electric dishwashers for household use – Methods for measuring the performance*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.4 operational cycle

Addition:

The operational cycle of a dishwasher begins with the start of the cycle by the operator and ends when the programme indicator reaches the end position

Addition:

3.101 rated capacity

the total number of place settings together with the serving pieces stated by the manufacturer, which can be washed and dried when loaded in accordance with the manufacturer's instructions

3.102 place setting and serving pieces

tableware and pieces as defined in the dishwashers performance standard.

NOTE See annex A of IEC 60436, Ed.3.¹

3.103 standard test load for noise measurements

the whole number of complete place settings plus the corresponding serving pieces, which together comprise the manufacturer's rated capacity

3.104 standard test programme for noise measurements

the same programme as used for measuring the cleaning performance, the drying performance and energy and water consumption, according to IEC 60436:2004.

NOTE 101 Usually this programme is the one recommended by the manufacturer for normally soiled load, using normal tableware, excluding cooking utensils.

3.105 drying

the 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 environments

This clause of Part 1 is applicable except as follows.

4.2 Direct method

Addition:

NOTE 101 If pure tone components are present in the noise emitted, proper precautions should be taken as specified in ISO 3743-2.

¹ In preparation.

4.3 Comparison method

Addition:

NOTE 101 If pure tone components are present in the noise emitted, proper precautions should be taken as specified in ISO 3743-1 and ISO 3743-2.

5 Instrumentation

This clause of Part 1 is applicable.

6 Operation and location of appliances 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 and the salt container, if included, shall be filled with water. Then the appliance shall be operated for at least two programme cycles as specified in 3.104, with or without load.

6.1.4 Not applicable.

6.2 Supply of electric energy and of water or gas

6.2.2 Not applicable.

6.2.3 Not applicable

6.2.4

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 ± 50) kPa, if not contradictory to the manufacturer's instructions. The temperature of cold water shall be (15 ± 5) °C and the temperature of hot water shall be (55 ± 5) °C.

NOTE When, in some countries, the water supply pressure/temperature differs from the water supply pressure/temperature of the country concerned, measurements carried out at rated pressure/temperature may be misleading for the consumer. In this case, additional measurements may be necessary. If the test pressure/temperature differs from the rated pressure/temperature, this should be reported.

6.4 Loading and operating of appliances during tests

6.4.2

Replacement:

The test load shall be dry and 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 3.104 and shall be loaded according to 3.103. The test must be carried out with unsoiled loads and without detergents and rinsing aids.

If the manufacturer's instructions clearly describe the loading with the rated capacity, the instructions shall be followed; otherwise the principles of 3.103 have to be followed. In the latter case, at least two series of measurements shall be carried out. For the second or the following series of measurements, the load shall be reasonably redistributed, following as far as possible the hints given by the manufacturer for general use.

If the dishwasher involves a regulator to adjust spray-force, water pressure shall be regulated according to the manufacturer's instructions for the standard test programme (see 3.104).

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

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

6.5 Location and mounting of appliances

6.5.1

Addition:

For floor-standing appliances and counter-top or table-top appliances intended for placing against a wall, the location shall be according to 6.5.3.

6.5.2 Not applicable

6.5.3

Replacement:

For measurements on floor-standing appliances intended for placing against a wall (including cabinets, counters or test enclosures 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 environment, the requirements given below shall be followed:

- the acoustic absorption coefficient of the vertical reflecting plane shall be smaller 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 at a distance of (10 ± 1) cm.

6.5.5

Replacement:

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

Appliances with an unremovable 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 figure 101, 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 required by the manufacturer's instructions, the enclosure shall be provided with ventilation openings accordingly.

In the rear left or right corner of the test enclosure, a cut-out at minimum size should be provided and shut by sealing means to avoid any noise leakage. This cut-out is provided to enable water and electricity supply as well as drainage. Care should be taken that no structure-borne noise is transmitted to the test enclosure.

If an appliance is provided with spacers, strips or other special means of solid or resilient material for closing the gap(s) between the contours of the appliance and the cabinet or enclosure, these means shall be used accordingly. If such means are not provided, the gap(s) are left open.

The test enclosure with the appliance is placed according to 6.5.3.

Appliances to be integrated shall be installed under the same conditions as built-in appliances. In addition, the door of the dishwashers shall be equipped, in accordance with the manufacturer's instructions, with a board of the maximum size allowed by the manufacturer and of the same material and thickness as the test enclosure, see figure 101.

Moreover the test enclosure shall be provided, in accordance with the manufacturer's instructions, at its lower front side with a skirting board of the maximum height which corresponds with the size of the board on the door of the appliance and of the same material and thickness as the test enclosure, see figure 101. If no instructions are given by the manufacturer, a skirting board as described above shall be pressed against the skirting board of the appliance.

7 Measurement of sound pressure levels

This clause of Part 1 is applicable except as follows:

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

7.1.3 Not applicable

7.1.5 to 7.1.6 Not applicable

7.4 Measurements

7.4.1

Addition:

The A-weighted sound pressure level shall be time-averaged over the whole duration of the operational cycle both with and without drying. The final result shall be the highest of the two values.

If the noise of the appliance under test varies periodically, care shall be taken to avoid any effect of synchronism between the variation of the noise emission and the measurement procedure (traverses of a moving microphone, duration of scanning the microphone positions, etc.).

7.4.4 Not applicable.

8 Calculation of sound pressure and sound power levels

This clause of Part 1 is applicable.

9 Information to be recorded

This clause of Part 1 is applicable except as follows:

9.6 Equipment and pre-conditioning of appliance under test

9.6.3 Not applicable.

9.7 Electric supplies, water supply, etc.

9.7.2 Not applicable.

9.7.4 Not applicable.

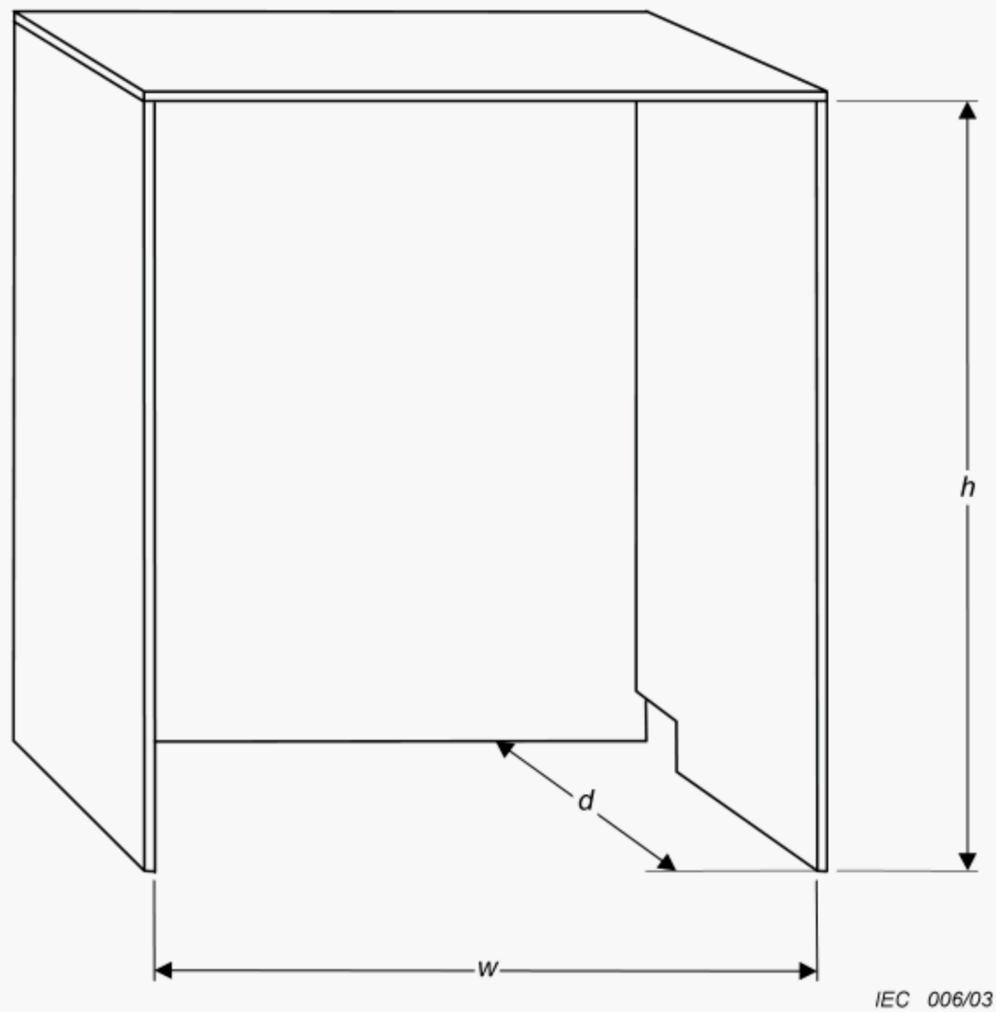
10 Information to be reported

This clause of Part 1 is applicable except as follows:

10.3 Test conditions for the appliance

10.3.3 Not applicable.

10.3.5 Not applicable.



$$h = h_n + (3 \pm 1) \text{ mm}$$

$$w = w_n + (5 \pm 1) \text{ mm}$$

$$d = d_n + (35 \pm 15) \text{ mm but at least } d \geq 550 \text{ mm}$$

where

h_n = smallest coordinating size according to 3.2.2 of ISO 3055:1985, which is applicable for the appliance;

w_n = width according to 3.4 of ISO 3055: 1985, which is applicable for the appliance;

d_n = outer depth of the appliance;

h = inner height of the test enclosure;

w = inner width of the test enclosure;

d = inner depth of the test enclosure.

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

The cut-out is described in 6.5.5.

Figure 101 – Test enclosure

Annex A
(normative)

Standard test table

This annex of part 1 is not applicable.

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