

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Household and similar electrical appliances – Test code for the determination of airborne acoustical noise –
Part 2-16: Particular requirements for washer-dryers**

**Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien –
Partie 2-16: Exigences particulières pour les lavantes-séchantes**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2-16: Particular requirements for washer-dryers

FOREWORD

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International Standard IEC 60704-2-16 has been prepared by subcommittee 59D: Home and similar laundry appliances of IEC technical committee 59: Performance of household and similar electrical appliances.

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

CDV	Report on voting
59D/455/CDV	59D/459/RVC

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 2-16 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 60704-1:2010.

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

This Part 2-16 supplements or modifies the corresponding clauses in IEC 60704-1. When a particular subclause of Part 1 is not mentioned in this Part 2-16, 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 and tables that are additional to those in Part 1 are numbered starting from 101.

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.

A list of all the parts in the IEC 60704 series, 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- withdrawn,
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INTRODUCTION

The noise of washer-dryers has been measured up to now by making use of two standards, IEC 60704-2-4 and IEC 60704-2-6. This first edition of IEC 60704-2-16 makes it possible to test the noise of washer-dryers by using one single standard. The following significant technical changes with respect to the separate use of IEC 60704-2-4:2011 and IEC 60704-2-6:2012 have been introduced:

- measurement uncertainty and standard deviations are taken into account,
- definition of periods and cycles, in particular definition of thermal spin period and continuous cycle,
- definitions of standard test programme and standard test load,
- location and mounting,
- information to be reported.

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 household washer-dryers.

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 household washer-dryers.

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

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

Part 2-16: Particular requirements for washer-dryers

1 Scope and object

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 washer-dryers for household and similar use 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 washer-dryers.

1.1.3 Size of the source

Replacement:

[IEC 60704-2-16:2019](https://standards.iteh.ai/catalog/standards/sist/56054202-0e23-449d-85c7-736ba34e1924/iec-60704-2-16-2019)

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 washer-dryers 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:

For washer-dryers, the estimated values of standard deviations of sound power levels, determined in accordance with this document are as indicated in Table 101 and 102.

**Table 101 – Standard deviations of sound power levels
of washing and spinning final results for washer-dryer**

Standard deviation (dB)	
σ_r (repeatability)	σ_R (reproducibility)
0,6	1,0

Table 102 – Standard deviations of sound power levels of drying final results for washer-dryer

Standard deviation (dB)	
σ_r (repeatability)	σ_R (reproducibility)
0,4	0,8

1.101 Standard deviation for declaration and verification

For the purpose of determining and verifying declared noise emission values for washing and spinning for washer-dryers in accordance with IEC 60704-3, the values indicated in Table 103 apply.

Table 103 – Standard deviations for declaration and verification for washing and spinning final results for washer-dryer

Standard deviation (dB)		
σ_p (production)	σ_t (total)	σ_M (reference)
1,0 to 2,2	1,4 to 2,4	2,5

For the purpose of determining and verifying declared noise emission values for drying for washer-dryers in accordance with IEC 60704-3, the values indicated in Table 104 apply.

Table 104 – Standard deviations for declaration for drying final results for washer-dryer

Standard deviation (dB)		
σ_p (production)	σ_t (total)	σ_M (reference)
0,7 to 1,0	1,1 to 1,3	1,5

2 Normative references

This clause of Part 1 is applicable except as follows:

Addition:

IEC 62512:2012, *Electric clothes washer-dryers for household use – Methods for measuring the performance*

IEC 60456:2010, *Clothes washing machines for household use – Methods for measuring the performance*

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*

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Addition:

3.101**washer-dryer**

household or similar electrical appliance for washing, rinsing and spinning of textiles that also provides a means for extracting excess water from the textiles by tumbling in a rotating drum, through which heated air is passed

Note 1 to entry: This definition is similar to IEC 60456:2010, 3.1.4.

3.102**rated washing capacity**

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one complete washing cycle

[SOURCE: IEC 62512:2012, 3.1.1]

3.103**rated drying capacity**

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one complete drying cycle

[SOURCE: IEC 62512:2012, 3.1.2]

3.104**rated washing-drying capacity**

maximum mass of conditioned textiles, in kg, which the manufacturer declares can be treated in one continuous operation cycle

[SOURCE: IEC 62512:2012, 3.1.3]

3.105**cotton test load**

textile load consisting of towels only as defined in Annex C of IEC 60456:2010

3.106**washing period**

operating period that begins at the first water filling of the main wash and ends at the start of the drainage pump before the first rinsing operation

Note 1 to entry: Options such as "pre-wash" are not included in the washing period.

[SOURCE: IEC 60704-2-4:2011, 3.1.4, modified – The phrase "operation period that" has been added.]

3.107**rinsing period**

operating period that begins at the start of the drainage pump before the first rinsing and ends at the start of the drainage pump after the last rinsing

[SOURCE: IEC 60704-2-4:2011, 3.1.5, modified – The phrase "operation period that" has been added.]

3.108**final spin period**

operating period that begins at the start of the drainage pump after the last rinsing period and ends with the end of the programme or with start of drying period

[SOURCE: IEC 60704-2-4:2011, 3.1.6, modified – The phrases "operation period that" and "or with start of drying period" have been added; the word "period" has been added after the word "rinsing".]

3.109**drying period**

operating period that begins with the start of operation of the drying fan and ends with the end of the programme, excluding the thermal spin period(s) if present

Note 1 to entry: The start of operation of the drying fan can be identified, for example, from changes of the current and/or power consumption of the washer-dryer.

3.110

thermal spin period

operating period of a drying programme or a drying period of continuous cycle that begins when the drum speed reaches higher than 100 r/min and ends when drum speed reduces to less than 100 r/min

Note 1 to entry: Thermal spin periods can occur several times during a drying cycle.

3.111

washing cycle

combination of washing period, rinsing period and final spinning period

Note 1 to entry: This definition is similar to IEC 62512:2012, 3.1.7.

3.112

drying cycle

combination of drying period and thermal spin period(s)

Note 1 to entry: This definition is similar to IEC 62512:2012, 3.1.8.

Note 2 to entry: The washer-dryer's final spinning noise level is obtained by data collected normally during the washing cycle, but also, in specific cases, by data collected during the drying cycle (see 8.101.5).

3.113

continuous cycle

combination of washing cycle and drying cycle without interruption

Note 1 to entry: This definition is similar to IEC 62512:2012, 3.1.4.

3.114

end of programme

moment in time when the washer-dryer indicates the end of the programme and the load is accessible for the user or, when there is no end of programme indicator and the door is locked during operation, the moment in time when the load is accessible to the user or, when there is no end of programme indicator and the door is not locked during operation, the moment in time when the power consumption of the appliance drops to a steady-state condition and the appliance is not performing any function

[SOURCE: IEC 60456:2010, 3.1.24, modified – The phrase "the program is complete" has been replaced by "moment in time", "washing machine" is replaced by "washer-dryer" and three sentences have been combined to a single phrase.]

3.115

test series

sequence of consecutive runs of the standard test programme

3.116

standard test programme

programme to be selected for noise testing

4 Measurement methods and acoustical environments

This clause of Part 1 is applicable except as follows:

4.2 Direct 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 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 except as follows:

5.3 Instrumentation for measuring operating conditions

5.3.4

Addition:

Spin speed shall be recorded at intervals of 1 s or less.

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

6.1.1

Addition:

Prior to each noise test, all filters, heat exchangers and ducts described as consumer service items in the manufacturer's instructions shall be cleaned.

6.1.3

Replacement:

<https://standards.iteh.ai/catalog/standards/sist/56054202-0e23-449d-85c7-24604931c072/iec-60704-2-16-2019>

Prior to noise measurements, the washer-dryer shall have been operated for at least five washing cycles as specified in 6.101 with a standard test load as specified in 6.102, but regardless of the average age of the test load.

Furthermore, prior to noise measurements, the washer-dryer shall have been operated for at least two drying cycles as specified in 6.101 with a standard test load as specified in 6.102, but regardless of the average age of the test load.

6.1.4

Replacement:

Care shall be taken to ensure conformance with the climatic conditions indicated in 6.3 of Part 1.

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:

For noise measurements, the static water pressure during filling shall be (240 ± 50) kPa, if not contradictory to the manufacturer's instructions.