

INTERNATIONAL STANDARD



**Household and similar electrical appliances –
Test code for the determination of airborne acoustical noise –
Part 2-7: Particular requirements for fans**



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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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Part 2-7: Particular requirements for fans**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
TEST CODE FOR THE DETERMINATION OF
AIRBORNE ACOUSTICAL NOISE –****Part 2-7: Particular requirements for fans**

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60704-2-7 has been prepared by subcommittee 59L: Small household appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 1997. This edition constitutes a technical revision.

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

- a) it includes additional fan categories as defined in IEC 60879:2019 and IEC 60665:2018;
- b) it includes standard deviations of sound power levels in 1.3;
- c) a comparison method has been added;
- d) the normative references have been updated (ISO 3744:2010 and ISO 3743-1:2010);
- e) it has been adjusted with regard to IEC 60704-1:2010.

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

CDV	Report on voting
59L/168/CDV	59L/174/RVC

Full information on the voting for the approval of this 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.

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.

This International Standard is to be used in conjunction with IEC 60704-1:2010, *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 standard establishes the test code for fans.

This Part 2-7 supplements or modifies the corresponding clauses in IEC 60704-1:2010, so as to establish the test code for fans. When a particular subclause of Part 1 is not mentioned in this Part 2-7, 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.

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INTRODUCTION

The measuring conditions specified in this Part 2-7 provide for sufficient accuracy in determining the noise emitted and the comparison of the results of measurements taken by different laboratories, whilst simulating as far as possible the practical use of household fans.

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 fans.

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

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

Part 2-7: Particular requirements for fans

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1 Scope

1.1.1 General

Replacement:

This document applies to electrical fans (including their accessories and their component parts) for household and similar use, designed for AC or DC supply.

The motor, the impeller and their housing, if any, form a single unit.

These particular requirements apply to:

- conventional fans,
- table fans,
- pedestal fans,
- ceiling fans,
- bladeless fans,
- wall bracket fans,
- ceiling bracket fans,
- louver fans,
- tower fans,
- ventilating and partition ventilating fans.

This standard does not apply to:

- fans that are part of a ventilation system,
- fans designed exclusively for industrial purposes,
- fans that are part of an appliance (for example cooling fans),
- fans with additional functions (for example heating, humidifying).

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

1.1.2 Type of noise

Replacement:

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

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 to ensure 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:

This document describes the determination of the noise emission of household fans in normal operation at maximum speed. Other speeds can, in addition, be used. Requirements for the declaration of noise emission values are not within the scope of this document.

The aim of this document is to ~~measure~~ give direction for measuring the noise in a room resulting from the operation of a fan.

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 in accordance with this document are given in Table 101:

Table 101 – Standard deviations of sound power levels

Standard deviation (dB)	
σ_r (repeatability)	σ_R (reproducibility)
0,4	1,0

Addition:

1.101 Standard deviation for declaration and verification

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

Table 102 – Standard deviations for declaration and verification

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

2 Normative references

This clause of Part 1 is applicable except as follows:

Replacement:

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 60665:1980, A.C. electric ventilating fans and regulators for household and similar purposes~~

IEC 60704-1:1997/2010, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*¹⁾

~~IEC 60879:1986, Performance and construction of electric circulating fans and regulators~~

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Addition:

~~3.101 **table fan:** A smaller diameter propeller bladed fan having two or more blades, intended for use with free inlet and outlet of air. It may be a table fan or bracket-mounted fan for wall or ceiling mounting. [IEC 60879]~~

~~NOTE — Adjustment of height, position and oscillation may be possible.~~

~~3.102 **pedestal fan:** A propeller type fan having two or more blades mounted on a pedestal of fixed or variable height and intended for use with free inlet and outlet of air. [IEC 60879]~~

~~NOTE — Adjustment of position and oscillation may be possible.~~

~~3.103 **ceiling fan:** A propeller bladed fan having two or more blades, and provided with a device for suspension from the ceiling of a room so that the blades rotate in a horizontal plane. [IEC 60879]~~

~~3.104 **partition (wall and window) fans:** Fans designed for installation in wall or window openings. The air is displaced from one room to another or to atmosphere, or vice versa (see also IEC 60665).~~

3.101

conventional fan

comfort fan with a propeller having two or more blades, with free inlet and outlet of air

[SOURCE: IEC 60879:2019, 3.2]

3.102

tower fan

comfort fan for use directly on the floor having a vertically elongated design of the cross flow type, tangential type or centrifugal type or impeller type with a free inlet and outlet of air

¹⁾ ~~To be published.~~

[SOURCE: IEC 60879:2019, 3.3]

3.103

bladeless fan

comfort fan of any type that is not fitted with a propeller

[SOURCE: IEC 60879:2019, 3.4]

3.104

ceiling fan

conventional fan provided with a device for suspension from the ceiling of a room so that the blades rotate in a horizontal plane with the diameter of the blade not larger than 1800 mm

[SOURCE: IEC 60879:2019, 3.5]

3.105

table fan

comfort fan intended for use on a table

Note 1 to entry: Table fans have a maximum adjustable or non-adjustable height not greater than 1200mm

Note 2 to entry: Adjustment of height, position and oscillation can be possible.

Note 3 to entry: It can be a table fan or bracket-mounted fan for wall or ceiling mounting.

[SOURCE: IEC 60879:2019, 3.6, modified – Note 2 to entry and Note 3 to entry added]

3.106

pedestal fan

comfort fan mounted on a pedestal of fixed or variable height

Note 1 to entry: Pedestal fans have a maximum adjustable height or non-adjustable height greater than 1 200 mm

Note 2 to entry: Adjustment of position and oscillation can be possible.

[SOURCE: IEC 60879:2019, 3.7, modified – Note 2 to entry added]

3.107

wall bracket fan

comfort fan for mounting on the wall

[SOURCE: IEC 60879:2019, 3.8]

3.108

ceiling bracket fan

comfort fan for mounting on the ceiling

[SOURCE: IEC 60879:2019, 3.9]

3.109

louvre fan

comfort fan having a moving louvre which provides a continuously changing multi-directional air flow

[SOURCE: IEC 60879:2019, 3.10]

3.110**ventilating fan**

fan intended to displace air either from one side of a partition to the other, or within a duct installed either on the fan inlet or on the fan outlet or both

[SOURCE: IEC 60665:2018, 3.2]

3.111**partition ventilating fan****type A ventilating fan**

ventilating fan installed in or upon the aperture of a partition in order to displace air from one side of the partition to the other side, both the sides being free spaces

[SOURCE: IEC 60665:2018, 3.3]

3.112**free inlet partition ventilating fan****type B ventilating fan**

ventilating fan with a direct inlet from free space and with ducted outlet

[SOURCE: IEC 60665:2018, 3.4]

3.113**free outlet partition ventilating fan****type C ventilating fan**

ventilating fan with ducted inlet, and with direct outlet to free space

[SOURCE: IEC 60665:2018, 3.5]

3.114**fully ducted ventilating fan****type D ventilating fan**

ventilating fan with ducted inlet and ducted outlet

[SOURCE: IEC 60665:2018, 3.6]

4 Measurement methods and acoustical environments

This clause of Part 1 is applicable except as follows:

4.2 Direct method

Addition:

~~NOTE — If pure tone components are present in the noise emitted, proper precautions should be taken as specified in ISO 3743-1, ISO 3743-2 and ISO 3744.~~

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, such as those specified in ISO 3743-2.

4.3 Comparison method

~~Modification:~~

~~The comparison method described in ISO 3743-1 is not applicable.~~

NOTES

~~1— Measurement according to ISO 3743-1 is under consideration.~~

~~2— If pure components are present in the noise emitted, proper precautions should be taken as specified in ISO 3743-1, ISO 3743-2 and ISO 3744.~~

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 can be necessary, such as those specified in ISO 3743-1 or ISO 3743-2.

5 Instrumentation

This clause of Part 1 is applicable except as follows:

Addition:

The use of a windscreen is mandatory, and necessary corrections for changes in the microphone sensitivity shall be added to the observed sound pressure levels.

6 Operation and location of appliances under test

This clause of Part 1 is applicable except as follows:

6.2 Supply of electricity and of water or gas

6.2.3

Not applicable.

6.2.4

Not applicable.

6.4 Loading and operating of appliances during tests

6.4.1

Replacement:

Load and operation should simulate normal use. Fans that can be tilted during normal use shall be located in the position with the highest emitted noise level, and the duration of the measurement shall be at least 10 s.

Fans that can oscillate automatically ~~will~~ shall operate when oscillating. In the case of oscillating appliances, the A-weighted sound pressure level shall be averaged on at least one complete cycle.

6.4.3

Not applicable.

6.5 Location and mounting of appliances

6.5.1

Addition:

Ceiling fans may be hung from a special support instead of from the ceiling. In this case, care shall be taken to ensure that the means of suspension or clamping do not change the sound output of the appliance. In order not to restrict the airflow, the distance between the lowest edge of the appliance and the reflecting plane (usually the floor) shall be at least 1,5 m.

Alternatively, ceiling fans can be mounted in the reverse working position on the reflecting plane, providing this does not affect sound radiation.

6.5.2

Not applicable.

6.5.3

Not applicable.

6.5.4

Replacement:

Partition (wall and window) fans shall be mounted in an opening made either:

- in a wall of the special reverberation test room; or
- on the second reflecting plane of the free field over a reflecting plane environment.

The height between the centre of the appliance and the floor shall be $1,5 \text{ m} \pm 0,05 \text{ m}$.

In all cases, care shall be taken to follow the instructions given by the manufacturer and to avoid any structure-borne noise.

Care shall be taken to avoid any restriction of the airflow.

Attention shall be paid to avoid any difference of pressure between the rooms concerned (or atmosphere), in order to avoid an unwanted load on the fan.

6.5.5

Not applicable.

6.5.7

Not applicable.

7 Measurement of sound pressure levels

This clause of Part 1 is applicable except as follows:

~~*Addition:*~~

~~The use of a windscreen is mandatory.~~

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

7.1.1

Addition:

This measurement surface shall be used for table, pedestal, louver, tower, bladeless, ceiling bracket and ceiling fans. Table fans are placed on the floor.

This measurement surface shall not be used for wall bracket fans and window fans.

The use of a windscreen is mandatory.

7.1.2

Not applicable.

7.1.3

Not applicable.

7.1.4

Replacement:

For partition (wall and window) fans and wall-mounted table fans, the measurement surface is a hemisphere, with 10 microphone positions as specified in Figure 101, centred in the projection of the geometrical centre of the reference box on the vertical plane, the coordinate system describing the microphone positions being located with the x - and y -axes in the vertical reflecting plan and the z -axis horizontally perpendicular to it. The x -axis lies in the horizontal central plane of the reference box. The front of the fan is directed towards the z -axis.

The area of this measurement surface is $S = 2\pi R^2$.

The radius of the hemisphere is 1 m.

7.1.5

Not applicable.

7.1.6

Addition:

This measurement surface shall be used for tall pedestal fans.

7.2 Microphone array and RSS location in hard-walled test rooms

Not applicable.

7.4 Measurements

7.4.4

Not applicable.