

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise –  
Part 2-1: Particular requirements for dry vacuum cleaners

Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien –  
Partie 2-1: Exigences particulières pour les aspirateurs à sec



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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 17.140.20; 97.080

ISBN 978-2-8322-8724-8

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## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope and object.....	6
1.1 Scope .....	6
1.1.1 General .....	6
1.1.2 Types of noise .....	6
1.1.3 Size of the source.....	6
1.2 Object.....	6
1.3 Measurement uncertainty .....	7
2 Normative references .....	8
3 Terms and definitions .....	8
4 Measurement methods and acoustical environments .....	9
5 Instrumentation.....	9
5.1 Instrumentation for measuring acoustical data .....	9
6 Operation and location of appliances under test .....	9
6.1 Equipping and pre-conditioning of appliances .....	9
6.2 Supply of electric energy and of water or gas.....	11
7 Measurement of sound pressure levels .....	14
8 Calculation of sound pressure and sound power levels.....	14
9 Information to be recorded.....	14
10 Information to be reported .....	14
Annexes .....	18
Annex A (normative) Standard test table.....	18
Bibliography.....	19
Figure 101 – Appliance with cleaning head connected directly .....	16
Figure 102 – Appliance with the cleaning head connected by hose and connecting tube .....	17
Table 101 – Standard deviations of sound power levels determined on carpets .....	7
Table 102 – Standard deviations of sound power levels determined on hard floors .....	7
Table 103 – Standard deviations for declaration and verification for vacuum cleaners for carpets .....	7
Table 104 – Standard deviations for declaration and verification for vacuum cleaners for hard floors .....	8

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
TEST CODE FOR THE DETERMINATION  
OF AIRBORNE ACOUSTICAL NOISE –****Part 2-1: Particular requirements for dry vacuum cleaners**

## FOREWORD

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International Standard IEC 60704-2-1 has been prepared by subcommittee 59F: Surface cleaning appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2014. This edition constitutes a technical revision.

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

- a) product scope is extended to cordless and similar vacuum cleaners;
- b) definitions of "cleaning head", "active nozzle" and "standard Wilton test carpet" have been added;
- c) specification of standard Wilton test carpet has been removed; reference is made to IEC TS 62885-1;

- d) specific requirements on equipping and pre-conditioning have been added;
- e) topic ageing of test carpet is addressed.

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

FDIS	Report on voting
59F/399/FDIS	59F/408/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 2-1 is intended 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 document establishes the test code for vacuum cleaners.

This Part 2-1 supplements or modifies the corresponding clauses in IEC 60704-1:2010. When a particular subclause of Part 1 is not mentioned in this Part 2-1, 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.

[IEC 60704-2-1:2020](https://standards.iteh.ai/catalog/standards/sist/d4d6bc34-5f59-4cb1-828d-86b6c50c19cc/iec-60704-2-1-2020)

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

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, 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 "<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 of IEC 60704 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 vacuum cleaners.

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 vacuum cleaners.

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

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[IEC 60704-2-1:2020](https://standards.iteh.ai/catalog/standards/sist/d4d6bc34-5f59-4cb1-828d-b6bb6b50ce1e/iec-60704-2-1-2020)

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

## Part 2-1: Particular requirements for dry vacuum cleaners

### 1 Scope and object

This clause of Part 1 is applicable except as follows:

#### 1.1 Scope

##### 1.1.1 General

*Replacement:*

This part of IEC 60704 is applicable for the determination of airborne acoustical noise of mains operated and cordless dry vacuum cleaners for household use or under conditions similar to those in households.

This part of IEC 60704 does not apply to vacuum cleaners for industrial or professional purposes.

NOTE Particular requirements for dry cleaning robots are specified in IEC 60704-2-17.

##### 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 vacuum cleaners.

##### 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, the maximum size of the appliance under test should fulfil the requirements specified in 1.2 of ISO 3743-1:2010 and 1.3 of ISO 3743-2:1994.

### 1.2 Object

*Addition:*

This part of IEC 60704 describes the determination of the noise emission of vacuum cleaners under normal operating conditions on carpet and hard floor in accordance with 4.6 of IEC 62885-2.

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



### 1.3 Measurement uncertainty

#### *Replacement:*

For vacuum cleaners designed for cleaning carpets the estimated values of standard deviations of sound power levels determined in accordance with this part of IEC 60704 are provided in Table 101.

**Table 101 – Standard deviations of sound power levels determined on carpets**

Standard deviation (dB)	
$\sigma_r$ (repeatability)	$\sigma_R$ (reproducibility)
0,3	0,8

For vacuum cleaners designed for cleaning hard floors the estimated values of standard deviations of sound power levels determined in accordance with this part of IEC 60704 are provided in Table 102.

**Table 102 – Standard deviations of sound power levels determined on hard floors**

Standard deviation (dB)	
$\sigma_r$ (repeatability)	$\sigma_R$ (reproducibility)
0,2	0,6

NOTE 101 The values in Table 101 and Table 102 are derived from the results of a round robin test (RRT) conducted in 2010/2011 with 4 different vacuum cleaners (passive and active) in 8 participating laboratories.

#### *Addition:*

#### 1.101 Standard deviation for declaration and verification

For the purpose of determining and verifying declared noise emission values for vacuum cleaners designed for cleaning carpets, in accordance with IEC 60704-3, the following values provided in Table 103 apply:

**Table 103 – Standard deviations for declaration and verification for vacuum cleaners for carpets**

Standard deviation (dB)		
$\sigma_P$ (production)	$\sigma_t$ (total)	$\sigma_M$ (reference)
0,5 to 1,0	0,9 to 1,3	1,5

For the purpose of determining and verifying declared noise emission values for vacuum cleaners designed for cleaning hard floors, in accordance with IEC 60704-3, the following values provided in Table 104 apply:

**Table 104 – Standard deviations for declaration and verification for vacuum cleaners for hard floors**

Standard deviation (dB)		
$\sigma_p$ (production)	$\sigma_t$ (total)	$\sigma_M$ (reference)
0,5 to 1,0	0,8 to 1,2	1,5

## 2 Normative references

This clause of Part 1 is applicable except as follows:

*Addition:*

IEC TS 62885-1, *Surface cleaning appliances – Part 1: General requirements on test material and test equipment*

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

[IEC 60704-2-1:2020](https://standards.iteh.ai/catalog/standards/sist/d4d6bc34-5f59-4cb1-828d-b6bb6b50ce1e/iec-60704-2-1-2020)

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This clause of Part 1 is applicable except as follows:

*Addition:*

### 3.101

#### cleaning head

plain nozzle or brush attached to a connecting tube, or a power nozzle, separate or part of the cleaner housing, and that part of a dry vacuum cleaner which is applied to a surface to be cleaned

[SOURCE: IEC 62885-2:2016, 3.3]

### 3.102

#### active nozzle

cleaning head provided with a driven agitation device to assist dirt removal

Note 1 to entry: The agitation device can be driven by an incorporated electric motor (motorized nozzle), an incorporated turbine powered by the air flow (air-turbine nozzle) or an incorporated friction or gear mechanism actuated by moving the cleaning head over the surface to be cleaned (mechanical nozzle).

[SOURCE: IEC 62885-2:2016, 3.4]

### 3.103

#### standard Wilton test carpet

Wilton carpet on which the vacuum cleaner and its cleaning head is placed for the measurement

Note 1 to entry: The specification of the standard Wilton test carpet can be found in IEC TS 62885-1.

### 3.104

#### standard hard floor

part of the floor on which the vacuum cleaner and its cleaning head is placed for the measurement

## 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 may increase. In such cases additional microphone positions or source positions may 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 may increase. In such cases additional microphone positions or source positions may be necessary, as specified in ISO 3743-1 or ISO 3743-2.

[IEC 60704-2-1:2020](#)

## 5 Instrumentation

This clause of Part 1 is applicable except as follows:

### 5.1 Instrumentation for measuring acoustical data

*Addition:*

The use of a windscreen is recommended. If necessary, the observed sound pressure level shall be corrected for changes in the microphone sensitivity, in accordance with the instructions accompanying the instrumentation.

## 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

*Replacement:*

The tube grip of cleaners with suction hose or the handle of other cleaners shall be held at a height of  $(800 \pm 50)$  mm above the test surface. Any telescopic suction tubes or sticks shall be extended to maximum length. For nozzles without pivoting connectors, it shall be ensured that the bottom of the cleaning head be made parallel with the test surface by adjusting the handle height within the tolerances. If this is not possible, the length of a telescopic tube or stick may be adjusted. Any adjustment shall be reported.

For declaration and compliance purposes, related tests conducted on a surface type (carpet or hard surface with or without crevice) shall be conducted with the same dry vacuum cleaner setting configurations such as power, cleaning head and cleaning head setting.

Unless otherwise specified, the dry vacuum cleaner setting configurations, such as cleaning head and cleaning head setting, shall be used and adjusted in accordance with the manufacturer's instructions for the surface to be cleaned (e.g. carpet or hard floor) for the test to be carried out.

In the absence of unambiguous instructions within the manufacturer's instructions, the product shall be tested with settings that are in accordance with any explicitly clear text, symbol or pictogram that is identifiable on the product.

If, after following the above order of checks, the tester believes the device under test to be in a configuration that is ambiguous, or that multiple configurations are possible with no way to clearly determine which is the most suitable for a given task, then the manufacturer shall be contacted for additional guidance.

If all of the above-mentioned measures to get information regarding the correct setting fail, the setting for maximum continuous airflow shall be used.

Complete details of the settings used for each cleaning task shall be recorded in the test documentation.

## iTeh STANDARD PREVIEW

If the dry vacuum cleaner is designed to be used with disposable dust receptacles, it shall, prior to each measurement, be equipped with a new dust receptacle of the type recommended or supplied by the manufacturer of the dry vacuum cleaner.

<https://standards.iteh.ai/catalog/standards/sist/d4d6bc34-5f59-4cb1-828d-b6b6b50cc1e/iec-60704-2-1-2020>

If the dry vacuum cleaner is provided with a reusable dust receptacle (as the sole original dust receptacle or as an enclosure for disposable dust receptacles), the dust receptacle and any additional filters removable without the aid of tools shall, prior to each measurement, be cleaned in accordance with the manufacturer's instructions until its mass is within 1 % or 2 g of its original mass, whichever is the lower.

Each test of a cordless dry vacuum cleaner is started with a fully charged sample. For tests where more than one repeat is needed, testing should be carried out on one full charge. This document does not currently address changing performance throughout the whole run time of some appliances. Results at different states of battery charge can vary. However, if the device becomes fully discharged during a repeat, that repeat is annulled, and the product is fully charged.

If the manufacturer provides no instructions on determination of fully charged battery, a charging time of 24 h shall be used.

After a full charge, the cordless cleaner shall not be tested until 30 min have elapsed, and before 48 h have elapsed. The cleaner shall be disconnected from the charger during this period.

Make a note in the report if it is not possible to test owing to a short runtime.

### 6.1.3

*Replacement:*

Prior to the first test on a new mains-operated vacuum cleaner, it shall be kept running with unrestricted air flow for at least 2 h to ensure adequate running-in. For active nozzles, the agitation device shall be running but not be in contact with the floor.

Prior to the first test (and following preparation in line with the manufacturer's instructions) on a new cordless dry vacuum cleaner, it shall be fully charged in accordance with the manufacturer's instructions and then discharged by running in the same setting as for the noise measurement with unrestricted air flow. The sequence shall be repeated one more time with an interval of at least two hours after each discharge. For active nozzles during discharge, the agitation device shall be running but not in contact with the floor.

Prior to conducting any series of tests, the age, condition, and history of the product shall be recorded.

#### 6.1.4

*Addition:*

If the vacuum cleaner is unused for more than 1 h, then the vacuum cleaner and attachments to be used shall be kept running for at least 10 min to allow them to stabilise.

For appliances supplied from batteries, this duration for stabilisation is reduced to 1 min.

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

### 6.2.2

*Addition:*

[IEC 60704-2-1:2020](https://standards.iteh.ai/catalog/standards/sist/d4d6bc34-5f59-4cb1-828d-66b0e021d3-0004-2-2020)

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Rechargeable vacuum cleaners are measured with fully charged batteries and disconnected from the external power source.

## 6.4 Loading and operating of appliances during tests

### 6.4.2

*Replacement:*

Vacuum cleaners shall be operated either on standard Wilton test carpet or on standard hard floor, depending on the function specified by the manufacturer. Vacuum cleaners designed for cleaning both carpets and hard floor shall be operated on a standard Wilton test carpet and on a standard hard floor.

The dry vacuum cleaner setting configurations, such as cleaning head and cleaning head setting, shall be used and adjusted in accordance with 6.1.1.

Before starting the measurement procedure, ensure that the cleaning head is adjusted correctly in accordance with the manufacturer's instructions for cleaning carpets and/or hard floors.

For operation of the appliance on carpets:

If there are no unambiguous instructions for cleaning heads equipped with a device to put out brushes or other retractable parts for cleaning carpets, adjust in such a way that the bristles protrude at least 2 mm from the theoretical support plane. All parts intended for hard floor treatment only shall be removed or retracted.