

# INTERNATIONAL STANDARD

**Household and similar electrical appliances – Test code for the determination of  
airborne acoustical noise –  
Part 2-13: Particular requirements for range hoods**

IEC 60704-2-13:2011

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

**Part 2-13: Particular requirements for range hoods**

FOREWORD

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International Standard IEC 60704-2-13 has been prepared by subcommittee 59K: Ovens and microwave ovens, cooking ranges and similar appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This second edition cancels and replaces the first edition (2000) and constitutes an adaptation to the third edition of IEC 60704-1 (2010).

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

FDIS	Report on voting
59K/219/FDIS	59K/223/RVD

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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 2-13 is intended to be used in conjunction with IEC 60704-1:2010 (3rd edition) *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60704-1.

This Part 2-13 supplements or modifies the corresponding clauses in IEC 60704-1, so as to establish the test code for range hoods. When a particular subclause of Part 1 is not mentioned in this Part 2-13, 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 is to 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 publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

The measuring conditions specified in this Part 2-13 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 range hoods.

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 range hoods.

Compared to the first edition (2000) of this Part 2-13, the second edition doesn't contain the description of an appropriate test enclosure which has now been incorporated in Part 1. The scope of this Part 2-13 has been extended to range hoods with an external fan. Furthermore the values of standard deviations of sound power levels determined according to this part are given.

In case of unavailability of an acoustical environment which is specified in Clause 4 of ISO 3743-1, ISO 3743-2 and ISO 3744 alternatively the sound power of range hoods can be determined according to Annex AA using the sound intensity method specified in ISO 9614-1 and ISO 9614-2. This method is not suitable if the source under test has significant noise over 4,0 kHz for octave band frequencies or 6,3 kHz for one-third octave band frequencies. Sound intensity method for the determination of sound power levels shall not be used for the purpose of verification.

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 2-13: Particular requirements for range hoods

### 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 electrical range hoods for household and similar use intended for filtering the air of a room or for exhausting the air out of a room, including their accessories and their component parts. It also applies to range hoods with an external fan which may be mounted inside or outside of the room where the range hood is located.

##### 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 range hoods.

##### 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 that the maximum size of the range hood under test fulfils the requirements specified in 1.3 of ISO 3743-1 and ISO 3743-2.

### 1.2 Object

*Addition:*

This standard describes the determination of the noise emission of household range hoods under normal operating conditions and at the highest fan speed setting for normal use.

NOTE 101 If a boost position is incorporated, this is not taken into account (see 6.5 of IEC 61591).

NOTE 102 A boost position is a setting of a control for occasional use, which results in a higher temporary fan speed (see 6.5 of IEC 61591).

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

NOTE 103 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 according to this standard, are as follows:

**Table 101 – Standard deviations of sound power levels**

Standard deviation (dB)	
$\sigma_r$ (repeatability)	$\sigma_R$ (reproducibility)
0,4	1,0

**1.101 Standard deviation for declaration and verification**

For the purpose of determining and verifying declared noise emission values according to IEC 60704-3, the following values apply:

**Table 102 – Standard deviations for declaration and verification**

Standard deviation (dB)		
$\sigma_P$ (production)	$\sigma_t$ (total)	$\sigma_M$ (reference)
1,5 – 1,7	1,8 – 2,0	2,0

**2 Normative references**

This clause of Part 1 is applicable with the following addition:

*Addition:*

IEC 61591:1997, *Household range hoods – Methods for measuring performance*  
 Amendment 1 (2005)<sup>1</sup>  
 Amendment 2 (2010)

ISO 7235:2003, *Acoustics - Laboratory measurement procedures for ducted silencers and air-terminal units - Insertion loss, flow noise and total pressure loss*

**3 Terms and definitions**

This clause of Part 1 is applicable with the following addition:

**3.101 range hood**

appliance installed over a hob and through which air is passed to remove contaminants from the room

[IEC 61591, definition 3.1]

**3.102 recirculation-air range hood**

range hood containing filters to remove contaminants, after which the cleaned air is discharged back into the room

[IEC 61591, definition 3.2]

<sup>1</sup> There exists a consolidated edition 1.1 of IEC 61591 (2005), that includes IEC 61591 (1997) and its amendment 1 (2005).



### 3.103

#### **air-extracting range hood**

range hood which discharges the collected air to the outside of the building by means of ducting. The range hood can incorporate an internal or external fan.

## 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 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:*

NOTE 101 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.

## 5 Instrumentation

This clause of Part 1 is applicable except as follows:

### 5.1 Instrumentation for measuring acoustical data

*Addition:*

Windscreens should be used if necessary and then corrections for change in the microphone sensitivity shall be added to the observed sound pressure levels.

## 6 Operation and location of appliance under test

This clause of Part 1 is applicable except as follows:

### 6.1 Equipping and pre-conditioning of appliance

#### 6.1.1

*Addition:*

Recirculation-air range hoods should be fitted with a clean filter(s).

Air-extraction range hoods shall be fitted with the pipe coupling ring, if any, having the largest diameter among those provided by the manufacturer. If the range hood is designed to accommodate additional filters, those filters shall be clean and appropriately fitted.

#### 6.1.3

*Replacement:*

Prior to noise measurements, the range hood shall have been in operation for running in for at least 4 h at the highest speed setting for normal use (see notes in 1.2).

#### 6.1.4

*Replacement:*

Immediately before each series of noise measurements, the range hood equipped for its intended use is operated for stabilizing at the highest speed setting for normal use (see notes in 1.2) for 10 min.

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

6.2.3 and 6.2.4 Not applicable

### 6.4 Loading and operating of appliance during test

#### 6.4.2

*Replacement:*

The appliances shall be equipped according to 6.1.1.

The range hood shall be operated at the highest speed setting for normal use (see notes in 1.2).

Air-extraction range hoods shall be loaded using a pipe connected to a muffler according to Figure 101. The pipe shall be rigid with smooth inner walls and shall have the widest diameter among those specified by the manufacturer. If not stated, a standard pipe with the best fitting diameter shall be used. The muffler shall have an insertion loss as specified in the table of Figure 101. It shall have a circular section with the same internal diameter as that of the pipe, a length as specified in Figure 101 and shall not have parts protruding inside that may cause additional pressure drops. The pipe and the muffler shall also comply with all the specifications reported in Figure 101 and care shall be taken that they do not radiate noise.

Range hoods with external fan shall be connected to the fan with a pipe and a muffler according to Figure 103. The pipe shall be rigid with smooth inner walls and shall have the widest diameter among those specified by the manufacturer. If not stated, a standard pipe with the best fitting diameter shall be used. The muffler shall be provided with the appliance. If the manufacturer did not provide a muffler, the appliance is tested without muffler.

In particular, when connecting the pipe and muffler system to the range hood, care shall be taken that this connection does not transfer any additional structure borne noise. For this purpose, isolating connecting pieces can be used.

Static forces from the standard exhaust to the range hood shall also be avoided.

NOTE 101 The fastening of the muffler should not influence the acoustical field in the test room; for example two wires could be fixed around the muffler and on the ceiling.

Whenever it is possible to choose among two or more exit holes for the pipe connection, the one on the upper side of the range hood, if any, shall be used.

Range hoods designed for connection with more than one pipe at the same time shall be connected accordingly to the number of pipes required.

6.4.3 Not applicable

## 6.5 Location and mounting of appliance

### 6.5.1

#### *Replacement:*

Range hoods not intended to be placed against a wall shall be supported by a stand with resilient means (example is given in Figure 102)

- either at a height of 0,6 m from the floor of the hard-walled test room or of the special reverberation test room with a minimum distance of 1 m between any surface (including protruding parts) of the range hood and the nearest wall;
- or at a height of 0,6 m from a reflecting plane of the free field environment, taking into account the shape and size of the specified measurement surface.

Care shall be taken in order to avoid any kind of interference between the supports and the air intake of the appliance under test.

**6.5.2 and 6.5.3** Not applicable

### 6.5.4

#### *Replacement:*

Range hoods intended to be placed against a wall are placed with a distance of  $D = 1 \text{ cm} \pm 0,5 \text{ cm}$  between the back of the appliance and a vertical wall and supported by a stand with resilient means (example is given in Figure 102)

- either at a height of 0,6 m from the floor of the hard-walled test room or of the special reverberation test room with the mentioned distance from one vertical wall and with a minimum distance of 1 m between any surface (including protruding parts) of the range hood and the nearest other wall;
- or at a height of 0,6 m on a horizontal reflecting plane in the free field environment and with the mentioned distance between the back of the range hood and the vertical reflecting plane. The minimum size of this vertical plane shall be at least equal to the size of the projection of the measurement surface. The acoustic absorption coefficient of the vertical reflecting plane shall be smaller than 0,06.

Care shall be taken in order to avoid any kind of interference between the supports and the air intake of the appliance under test.

Care should be taken to avoid any direct contact between the appliance (including protruding parts, worktops, spacers, etc.) and the vertical reflecting plane.

#### 6.5.101

For range hoods with external fan the air inlet device shall be located and mounted as described in 6.5.1 or 6.5.4. The external fan shall be located in a way that the noise emitted by the housing of the fan and by the air outlet does not influence the measurement result.

## 7 Measurement of sound power 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)

### 7.1.1

#### *Replacement:*

For range hoods not intended to be placed against a wall, including built-in appliances, the measurement surface is a parallelepiped with nine microphone positions, as specified in 7.3.1 of ISO 3744 and in Figure 1 of IEC 60704-1. Additional measurement positions may be required according to 7.3.2 of ISO 3744. The number of microphone positions may also be reduced according to 7.4.2 of ISO 3744.

While defining the reference box around the appliance, the loading pipe connected to a range hood operating in exhausting mode should not be taken into account.

NOTE 101 The front of the appliance is directed in the direction of the  $x$ -axis. The preferred value of the measurement distance  $d$  is 1 m.

### 7.1.2

#### *Replacement:*

For range hoods intended to be placed against a wall, including built-in appliances, the measurement surface is a parallelepiped with six microphone positions, as specified in 7.3.1 of ISO 3744 and in Figure 2 of IEC 60704-1. Additional measurement positions may be required according to 7.3.2 of ISO 3744. The number of microphone positions may also be reduced according to 7.4.2 of ISO 3744.

While defining the reference box around the appliance, the loading pipe connected to a range hood operating in exhausting mode should not be taken into account.

NOTE 101 The  $x$  and  $y$  axes are located in the vertical reflecting plane, with the  $x$ -axis directed vertically upwards and the front of the appliance directed in the direction of the  $z$ -axis. The preferred value of the measurement distance  $d$  is 1 m.

7.1.3 to 7.1.6 Not applicable

## 7.4 Measurements

### 7.4.1

#### *Addition:*

The A-weighted time averaged sound pressure level shall be measured over a period of at least 30 s.

## 8 Calculation of sound pressure and sound power levels

This clause of Part 1 is applicable except as follows:

### 8.1

#### *Addition:*

Noise emitted by the housing or by the air outlet of an external fan shall be considered as background noise.