

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Cooking fume extractors – Methods for measuring performance

Extracteurs de fumée de cuisine – Méthodes de mesure de l'aptitude à la fonction

[IEC 61591:2019](#)

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ICS 97.040.20

ISBN 978-2-8322-7410-1

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**COOKING FUME EXTRACTORS –  
METHODS FOR MEASURING PERFORMANCE**

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International Standard IEC 61591 has been prepared by subcommittee 59K: Performance of household and similar electrical cooking 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, Amendment 1:2005 and Amendment 2:2010. This edition constitutes a technical revision.

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

- a) new subclause about instruments and measurements (see 6.6);
- b) new procedure for measuring the fluid dynamic efficiency (FDE), which follows the CENELEC proposal in principle;
- c) revised procedure for determining the odour reduction for cooking fume extractors in recirculation mode (see Clause 12);
- d) modification to the measurement of the effectiveness of the lighting system (see Clause 11);
- e) clearer procedure to measure the grease absorption (see Clause 13);

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

CDV	Report on voting
59K/304/CDV	59K/306/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.

In this standard, the following print types are used:

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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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# COOKING FUME EXTRACTORS – METHODS FOR MEASURING PERFORMANCE

## 1 Scope

This document applies to **cooking fume extractors** incorporating a fan for the **recirculation** or **extraction mode** situated in a household kitchen.

It can also be used for **cooking fume extractors** where the fan is mounted separately from the appliance, but controlled by the appliance when the fan is defined in the technical documentation (e.g. name plate data) and instructions for installation.

This document deals also with **down-draft systems** arranged beside, behind or under the cooking appliance.

This document defines the main performance characteristics of these appliances, which are of interest to the user, and specifies methods for measuring these characteristics.

This document does not specify a classification or ranking for performance.

NOTE This document does not deal with safety requirements that are in accordance with IEC 60335-1 and IEC 60335-2-31.

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## 2 Normative references

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The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60704-2-13, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-13: Particular requirements for range hoods and other cooking fume extractors*

IEC 62301, *Household electrical appliances – Measurement of standby power*

ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 1: General principles and requirements*

ISO 5167-2, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 2: Orifice plates*

ISO 5167-3, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 3: Nozzles and Venturi nozzles*

ISO 5167-4, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 4: Venturi tubes*

ISO 80000-1:2009, *Quantities and units – Part 1: General*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **cooking fume extractor**

appliance with fan and filter intended to collect and treat cooking fumes, which can be operated in **recirculation mode** or **extraction mode**

#### 3.2

##### **range hood**

**cooking fume extractor** installed over a cooking appliance

##### 3.2.1

##### **wall range hood**

**range hood** mounted to the wall

##### 3.2.2

##### **island range hood**

**range hood** mounted to the ceiling

##### 3.2.3

##### **ceiling range hood**

**range hood** integrated onto or into the ceiling

##### 3.2.4

##### **built-in range hood**

**range hood** mounted onto or into a cabinet

#### 3.3

##### **microwave hood combination**

cooking fume extractor integrated in a microwave oven

#### 3.4

##### **multiple combination hood**

cooking fume extractor where the fan is mounted separately of the appliance, but controlled by the appliance

#### 3.5

##### **down-draft system**

**cooking fume extractor** intended for installation adjacent to a cooking appliance or integrated in a cooking appliance that draws vapour down into a duct

Note 1 to entry: A **down-draft system** can also be a system where the fan is mounted separately from the appliance but controlled by the appliance.

#### 3.6

##### **recirculation mode**

mode of a **cooking fume extractor** that discharges air back into the room, which includes an **odour-reduction filter**

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**3.7  
extraction mode**

mode of a **cooking fume extractor** that discharges the air to the outside of the building by means of ducting

Note 1 to entry: **Extraction mode** is also known as "vented mode" or "ducted mode".

**3.8  
rated voltage**

voltage assigned to the **cooking fume extractor** by the manufacturer

**3.9  
grease absorption factor**

$G_{FE}$

percentage of grease retained within a **grease filter**

**3.10  
grease filter**

components for absorbing grease, which are intended to be replaced or removed for cleaning without tools

**3.11  
odour-reduction filter**

components for reducing odour

**3.12  
odour reduction factor**

capability of the **cooking fume extractor** to reduce odours

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**3.13**

**odour dispersion time**

time taken to reduce odours to a defined level after the odour generating source has been switched off

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**3.14  
highest continuous setting for normal use**

control setting of **cooking fume extractor** at highest speed, excluding the **boost position setting**

Note 1 to entry: Marked setting on the appliance, which is described in the instructions for use.

**3.15  
boost position setting**

marked control setting at maximum fan speed, which is automatically limited in duration

Note 1 to entry: Marked setting on the appliance, which is described in the instructions for use.

**3.16  
working point**

intersection point of pressure/airflow curve and resistance curve

**3.17  
best efficiency point**

**BEP**

maximum value of the efficiency of a **cooking fume extractor**

Note 1 to entry: This term applies to the French language only.

### 3.18 lighting system

devices used for the illumination of the cooking surface, excluding ambient illumination, unless there is only one control switch

Note 1 to entry: Power supply units and controllers are included.

### 3.19 illumination $E_{middle}$

average illumination of the **lighting system** on the cooking surface measured in lux under standard conditions

## 4 Classification

According to the mode:

- **recirculation mode**;
- **extraction mode**.

A **cooking fume extractor** may be constructed to incorporate both modes.

## 5 List of measurements

Performance is determined by assessing the following:

- overall dimensions;
- mass;
- power measurement of **low-power modes**;
- airborne acoustical noise;
- volumetric airflow;
- effectiveness and electric power input of the **lighting system**;
- ability to reduce odours;
- ability to absorb grease.

## 6 General conditions for measurements

### 6.1 Test room

The tests are carried out in a draught-free room. The ambient temperature of the room is maintained at  $(23 \pm 2)$  °C. The absolute air pressure shall be between 913 hPa and 1 063 hPa.

### 6.2 Installation and positioning

The appliance has to be clean and free of any residues of packaging material and protective foil. All tests have to be carried out following the order of the clauses of this document with one and the same appliance.

The **cooking fume extractor** (except for the **down-draft system**) is installed above a cooking appliance with the distance of  $(600 \pm 10)$  mm. The distance is determined between the lowest level of the cooking fume extractor and the highest level of the cooking appliance. The cooking fume extractor is installed and operated in accordance with the manufacturer's instructions (except for the distance above the cooking appliance).

Any extendible visor, which is extendable for normal use in accordance with the manufacturer's instructions, shall be opened accordingly. If no instructions are given, the extendible visor is fully opened.

If the **down-draft system** can be elevated, the manufacturer's instructions are followed; otherwise, it shall be measured in its maximum elevated position for use.

The maximum sized duct in accordance with the manufacturer's instructions is to be used.

For all tests, the appliance is operated with unchanged default factory settings (e.g. brightness of the display or changeable light colour). Supplementary parts that are part of the appliance are mounted in accordance with the manufacturer's instructions. Ensure that no network is connected to the appliance for the duration of the measurement, except for the remote control.

Before the measurement is made, any conditioning of the **cooking fume extractor**, unless explicitly required in this document, is not allowed.

Ensure that any automatic modes, where the fan speed is altered, are switched off.

### 6.3 Electricity supply

The **cooking fume extractor** is supplied at the **rated voltage**  $\pm 1$  %.

If the appliance has a **rated voltage** range, the tests are carried out at the nominal voltage of the country where the appliance is intended to be used.

The supply frequency shall be at the rated frequency  $\pm 1$  % throughout the test. If a frequency range is indicated, then the test frequency shall be that of the nominal frequency of the country in which the appliance is intended to be used.

### 6.4 Filters

For all tests, it shall be ensured that all filters are positioned correctly.

For appliances with more than one **grease filter**, the filters shall be positioned with no gap in between (centrally positioned).

### 6.5 Fan control

**Cooking fume extractors** shall be tested in the **highest continuous setting for normal use**, as stated in the manufacturer's instructions.

### 6.6 Instrumentation and measurements

Instruments used and measurements made for this document shall comply with the specifications in Table 1 and Table 2. The accuracy is applied to the measured value.

**Table 1 – Instruments**

Parameter	Unit	Minimum resolution	Accuracy	Additional requirements
Mass	g	0,1 g	±0,5 g	
Temperature	°C	0,1 °C	±1,5 K	Thermocouple type J or K in accordance with IEC 60584-1 or PT100 sensor in accordance with IEC 60751.
Time	s	1 s	±1 s	
Power	W	-	±1 %	
Illuminance	lx		±10 %	Value under consideration – International standard about illuminance classification is pending.
Pressure/Air pressure	Pa		±1 %	The accuracy is for pressures ≤ 150 Pa at least 1,5 Pa.

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**Table 2 – Measurements**

Parameter	Unit	Minimum resolution	Accuracy	Additional requirements
Voltage	V	-	±0,5 %	-
Volumetric airflow	m <sup>3</sup> /h		±2 %	
Power measurement		-	-	In accordance with IEC 62301

If numbers have to be rounded, they shall be rounded to the nearest number in accordance with ISO 80000-1:2009, B.3, Rule B. If the rounding takes place to the right of the comma, the omitted places shall not be filled with zeros.

## 7 Dimensions and mass

### 7.1 Overall dimensions

The overall dimensions of the **cooking fume extractor** are measured. The longest width, depth and height, including any control knobs or other projections, are stated in millimetres rounded to 10 mm. If dimensions are variable while the **cooking fume extractor** is operated in normal use, then the minimum and maximum sizes are stated.

For **cooking fume extractors** with **extraction mode**, the dimensions of the air-outlet orifice are measured and stated.

### 7.2 Distance between cooking fume extractor and cooking appliance

The shortest distance between the lowest level of the **cooking fume extractor**, except **down-draft systems**, and the highest level of the cooking appliance is measured and indicated in millimetres, rounded to 10 mm.

### 7.3 Mass

The mass of the **cooking fume extractor**, including any filters, supply cord and plug, is measured and stated in kilograms, rounded to one decimal place.

## 8 Power measurement of low power modes

The power of low-power modes are measured in accordance with IEC 62301.

## 9 Airborne acoustical noise

Where an airborne acoustical noise measurement is required, it shall be measured in accordance with IEC 60704-2-13.

NOTE A possible procedure for the statistical determination of declared noise values is described in IEC 60704-3.

## 10 Volumetric airflow

### 10.1 Purpose

The purpose of this test is to determine the volumetric airflow in general (see 10.3) and at the **best efficiency point (BEP)** (see 10.4).

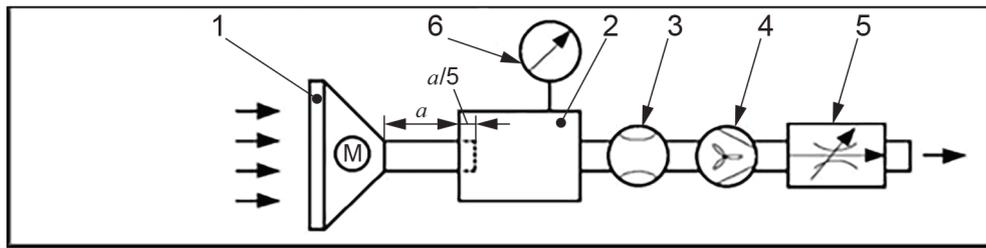
The airflow is measured in accordance with the methods contained in ISO 5167-1, ISO 5167-2, ISO 5167-3 and ISO 5167-4. **(standards.iteh.ai)**

### 10.2 Measuring setup

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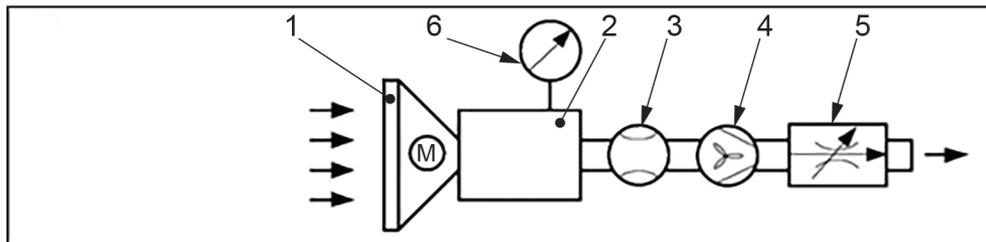
The maximum possible air-outlet of the **cooking fume extractor** is connected to a pressure compensation chamber (see Figure 1). The duct diameter needs to be the same as that of the air-outlet.

A **cooking fume extractor** without ducting, e.g. a **cooking fume extractor** with **recirculation mode**, is connected directly to the pressure compensation chamber as shown in Figure 1b). The pressure compensation chamber shall be adapted to the dimensions of the **cooking fume extractor** under test.



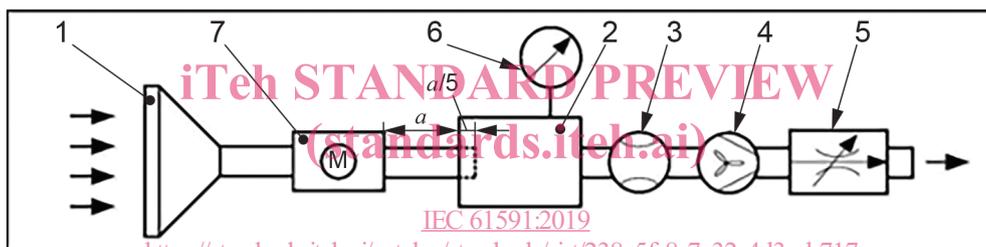
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a) Setup for cooking fume extractor with duct



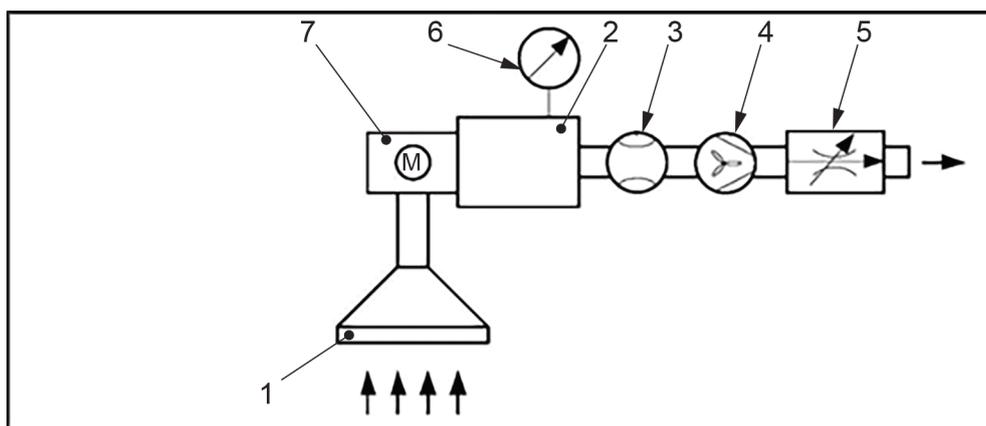
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b) Setup for cooking fume extractor without duct



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c) Multiple combination hood or down-draft system with fan for indoor use



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d) Multiple combination hood or down-draft system with fan for outdoor use

**Key**

- |          |   |   |                        |
|----------|---|---|------------------------|
| <i>a</i> | 5 times the diameter of the duct, which shall be sealed | 4 | auxiliary fan          |
| 1        | <b>cooking fume extractor</b>                           | 5 | baffle                 |
| 2        | pressure compensation chamber                           | 6 | static pressure gauge  |
| 3        | pressure differential device for airflow measurement    | 7 | separately mounted fan |

**Figure 1 – Measurement of airflow**