IEC 61591

Edition 3.1 2026-08

INTERNATIONAL STANDARD

CONSOLIDATED VERSION

Cooking fume extractors - Methods for measuring performance

ICS 97.040.20

ISBN 978-2-8327-1475-1

IEC 61591:2023-03+AMD1:2026-08 CSV(en)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

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

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

COOKING FUME EXTRACTORS – METHODS FOR MEASURING PERFORMANCE

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61591 edition 3.1 contains the third edition (2023-03) [documents 59K/352/CDV and 59K/361/RVC] and its amendment 1 (2026-08) [documents 59K/424/CDV and 59K/432/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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. It is an International Standard.

This third edition cancels and replaces the second edition published in 2019. This edition constitutes a technical revision.

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

a) new definition of **working point**, see 3.19;
b) new definition for **lowest setting** and **automatic setting**, see 3.17 and 3.18;
c) revised requirements for installation and positioning, see 6.2;
d) added a normative reference ISO 5801 for the specification of the pressure compensation chamber, see Clause 10;
e) separate clauses for determining the volumetric airflow and fluid dynamic efficiency, see Clauses 10 and 11;
f) new approach for determining the fluid dynamic efficiency ("9-point calculation");
g) new definitions, new clause and new Annex B regarding the measurement of low-power modes;
h) new Annex A: assumption for the parameter b.

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

Draft	Report on voting
59K/352/CDV	59K/361/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

In this standard, the following print types are used:

– terms listed in Clause 3: **Arial bold**.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under 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.

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

NOTE 2 **Cooking fume extractors** without fans operated by a central ventilation system are covered in EN 13141-3.

2 Normative references

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 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

IEC 62301~~:2011~~, ~~*Household electrical appliances –*~~ *Measurement of standby power for appliances and equipment*

IEC 63474~~:~~ [1], *Electrical and electronic household and office equipment – Measurement of networked standby power consumption of edge equipment*

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*

[1] ~~Under preparation. Stage at the time of development: IEC CDV 63474:2022.~~

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 5801:2017, *Fans – Performance testing using standardized airways*

ISO 80000-1:~~2009~~2022, *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 terminology databases for use in standardization at the following addresses:

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

3.1
active mode
mode in which the appliance is connected to a mains power source, has been activated, and is performing any of the intended functions

EXAMPLE Intended functions are running the fan or operating the lighting system.

Note 1 to entry: Associated activities include displaying information, software download, sensor controlled automatic mode and communication with the hob.

3.2
cooking fume extractor
CFE
appliance with fan and filter intended to collect and treat cooking fumes, which can be operated in **recirculation mode** or **extraction mode**

3.3
range hood
cooking fume extractor installed over a cooking appliance

3.3.1
wall range hood
range hood mounted to the wall

3.3.2
island range hood
range hood mounted to the ceiling

3.3.3
ceiling range hood
range hood integrated onto or into the ceiling

3.3.4
built-in range hood
range hood mounted onto or into a cabinet

3.4
microwave hood combination
cooking fume extractor integrated in a microwave oven

3.5
multiple combination hood
cooking fume extractor where the fan is mounted separately of the appliance, but controlled by the appliance

3.6
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.

3.7
recirculation mode
mode of a **cooking fume extractor** that discharges air back into the room, which includes an **odour-reduction filter**

3.8
extraction mode
vented mode
ducted 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".

3.9
rated voltage
voltage assigned to the **cooking fume extractor** by the manufacturer

3.10
grease absorption factor
G_{FE}
percentage of grease retained within a **grease filter**

3.11
grease filter
components for absorbing grease, which are intended to be replaced or removed for cleaning without tools

3.12
odour-reduction filter
components for reducing odour

3.13
odour reduction factor
capability of the **cooking fume extractor** to reduce odours

3.14
odour dispersion time
time taken to reduce odours to a defined level after the odour generating source has been switched off

3.15
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.

3.16
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.

3.17
lowest setting
marked control setting at which the **cooking fume extractor** operates at its lowest speed

3.18
automatic setting
control setting of **cooking fume extractor** where the fan speed is altered by a sensor or time

Note 1 to entry: Automatic settings are not used for calculation of the fluid dynamic efficiency (FDE).

3.19
working point
WP
intersection point of pressure/airflow curve and resistance curve – measured WP and compensated to reference air density WP_C

3.20
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.

3.21
illumination
E_{middle}
average illumination of the **lighting system** on the cooking surface, measured in lux, under standard conditions

3.22
network
communication infrastructure with a topology of links, an architecture and which includes the physical components, organizational principles, communication procedures and formats (protocols)

Note 1 to entry: An infrared (IR) remote control is not considered to be a **network**.

3.23
off mode
condition in which the appliance is connected to the mains and is not providing any active mode or standby function and where the mode may persist for an indefinite time

Note 1 to entry: The following shall also be considered as off mode

a) conditions providing only an indication of off mode;

b) conditions providing only functionalities intended to ensure electromagnetic compatibility.

3.24
standby mode
condition where the appliance is connected to the mains and provides only the following functions, which ~~may~~ can persist for an indefinite ~~time~~ duration:

a) reactivation function, or reactivation function and a mere indication of enabled reactivation function; ~~and/or~~

b) information or status display; ~~and/or~~

c) ~~detection function for emergency measures~~ protective function.

EXAMPLE 1 An example for the protective function is an acoustical signal when touch controls are overflowed with water.

EXAMPLE 2 An example for the reactivation function is an internal touch control sensor, which continuously monitors any user's interaction.

[SOURCE: IEC 60350-1:2023, 3.17, and IEC 60350-1:2023/AMD1:2025, 3.17, modified – "one or more of" has been deleted from the definition, item b) has been included in item a), item c) has been modified and examples have been added.]

3.25
standby mode in condition of networked standby
condition where the appliance is connected to the mains and provides only the reactivation function through a connection to a **network**, which may persist for an indefinite time.

Note 1 to entry: This mode is only applicable to appliances that provide a connection function to a **network**.

4 Classification

According to the mode:

– **recirculation mode**;
– **extraction mode**.

A **cooking fume extractor** can 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;
– fluid dynamic efficiency;
– 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 ± 2) °C. The absolute air pressure shall be between 91,3 kPa and 106,3 kPa.

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 ± 10) mm. The distance is determined between the lowest level of the **cooking fume extractor** and the highest level of the cooking appliance.

For the lowest level of the cooking fume extractor, any pull-out or swing-out mechanisms are not considered.

Any pull-out or swing-out mechanism that can be opened to a position for normal use in accordance with the manufacturer's instructions shall be opened during all tests. Positions that are for cleaning and maintenance purposes only shall be not considered. If the manufacturer's instruction does not state any information, the pull-out or swing-out mechanism shall be completely closed.

The position for the pull-out or swing-out mechanism shall be maintained unchanged for all tests except low power mode measurements in Clause 8.

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.

If there are different options delivered with the **CFE**, then, for all tests, the air outlet with its properties closest to a theoretical resistance curve for a flue pipe with b = 0,000 125 shall be used. This setup shall be kept for all measurements described in this document.

NOTE More information for b is given in Table 3.

All tests, except the measurements for low-power modes (see Clause 8), are carried out:

– with the default factory settings except adjusting extraction or recirculation mode, if necessary;
– ensure that no **network** is connected to the appliance for the duration of the measurement.

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

Ensure that any **automatic settings** are switched off.

6.3 Electricity supply

The **cooking fume extractor** is supplied at the **rated voltage** ±1 %. The supply voltage shall be recorded at the point where the appliance is connected to the mains supply during all tests. 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 ±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 and at least 1,5 Pa.
Linear dimensions for cabinets, countertop and width of CFE	mm	1 mm	±1 mm	

Table 2 – Measurements

Parameter	Unit	Accuracy	Additional requirements
Voltage	V	±0,5 %	-
Volumetric airflow	m^3/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, Clause B.3, Rule B. If the rounding takes place to the right of the comma, the omitted places shall not be filled with zeros.

The tolerances specified for parameters within this document, using the symbol "±", indicate the allowable limits of variation from the specified targets outside which the test or results shall be invalid. The statement of tolerance shall not be used for deliberate variation of these specified targets.

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

8.1 Purpose and combination of appliances

This clause sets out determination of **off mode**, **standby mode** and **standby mode in condition of networked standby**. Other low-power modes can exist in some appliances, but for the current designs, these are not considered important in terms of duration and energy consumption.

8.2 Measurement

8.2.1 Principles

The requirements of IEC 62301 and IEC 63474 shall be ~~observed~~ applied in addition to the following requirements.

~~However, IEC 62301:2011,5.3 (procedure) and the requirement defining air speed in IEC 62301:2011, 4.2 shall not apply.~~

However, instruments and measurements shall not be in accordance with 6.6 but with the requirements set in IEC 62301.

When testing appliances that are fitted with a clock, the clock shall be adjusted to the correct time and date as specified in the instructions.

If energy consumption is influenced by the continuously changing displayed time of a clock, a measurement period of 24 h is necessary. The average value from this measurement is noted.

If the appliance has an ambient light sensor, two illuminance levels in accordance with IEC 62301 shall be measured during the 24 h period, each illuminance level for 12 h.

If an option is provided to the user to switch off the display, both the switched on and switched off mode are to be tested and reported.

Ensure that the following conditions remain relevant for the duration of the measurement:

– instructions for use regarding installation, operation and settings (as applicable) are followed;
– the appliance shall be connected to mains power for the duration of the test; if the appliance is supplied without cable, a cable length of 1 m shall be used;
– no adverse warning indicators are present;
– follow the manufacturer's instructions regarding the configuration of **network** connectivity (where applicable);
– ensure that the **network** is connected to the appliance (when required);
– after each appliance interaction, wait at least ~~15~~ 20 min before commencing with measurements; and
– no interference during measurement by any interaction.

Some appliances can require software updates to ensure secure **network** operations. It is recommended to allow those updates to be installed and to make a note of it in the test report. Updates can occur or can be requested after activation of **network** capability and the update process can affect energy during measurement. The measurement starts after the completion of any software update.

The required power consumption can be determined by measuring the power consumption directly for a certain period of time (not less than 10 min). The data shall be recorded at regular intervals of 1 s or less throughout the test using a data logger or computer. The average power is given in watts and rounded with two valid digits after the decimal point.

Alternatively, the energy consumption can be measured for a certain period of time (not less than 10 min) and the power consumption be calculated by dividing the measured energy consumption (measured in Wh) by the duration of the measurement (in h). The calculated power is given in watts and rounded with two valid digits after the decimal point.

Appliance interactions during an **active mode** shall not be considered for measurement. A step-by-step instruction for measuring the low-power modes is given in Annex B (Table B.1).

8.2.2 Determination of power consumption in off mode

This subclause is only applicable to appliances providing an **off mode**.

The appliance under test should be set to **off mode** in accordance with the manufacturer's instructions. All actions required to set to **off mode** shall be taken into account.

In all cases, **off mode** shall be determined over a period of not less than 10 min. The power consumption of the **off mode** is the average of the measured data.

If the appliance provides an **off mode**, it should be described by the manufacturer.

8.2.3 Determination of power consumption in standby mode

This subclause is only applicable to appliances providing a **standby mode**.

The appliance under test should be set to **standby mode** in accordance with the manufacturer's instructions.

In all cases, **standby mode** shall be determined over a period of not less than 10 min. The power consumption of the **standby mode** is the average of the measured data.

If the appliance provides a **standby mode**, it should be described by the manufacturer.