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Edition 3.0 2023-03
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

Cooking fume extractors – Methods for measuring performance

IEC 61591:2023-03 CMV(en)

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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.
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This commented version (CMV) of the official standard IEC 61591:2023 edition 3.0 allows the user to identify the changes made to the previous IEC 61591:2019 edition 2.0. Furthermore, comments from IEC SC 59K experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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.

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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 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*

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*

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*

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

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, *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

~~**3.17**~~
~~**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.~~

3.20
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 persist for an indefinite time:

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.

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** ~~may~~ 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. ~~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.~~

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. **1**

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 manfacturer'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.~~

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** ~~modes~~ **settings**~~, where the fan speed is altered,~~ 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. **2**

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.

Table 2 – Measurements

Parameter	Unit	~~Minimum resolution~~	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. **3**

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.~~

4

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 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.

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: **5**

- 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 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.

8.2.4 Determination of consumption in standby mode in condition of networked standby 6

This subclause is only applicable to appliances providing a **standby mode in condition of networked standby**.

For **appliances** with **network** connectivity, follow the manufacturer's instructions regarding the configuration of the appliance and ensure that the **network** (e.g. LAN or WLAN) is connected to the appliance and activated.

The highest possible power consumption can be reached when the appliance is not only connected to the **network**, but also to a remote user interface (i.e. mobile app). Avoid any interaction with the remote user interface during the 15 min waiting time and the measurement.

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

Ensure that there is no download and no update running during the measurement.

The test report shall contain the description of the **network** connection used.

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 and test set up

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 volumetric airflow ~~is measured in accordance with the methods contained~~ measurement shall comply with the requirements stated in ISO 5167-1, ISO 5167-2, ISO 5167-3 and ISO 5167-4.

~~**10.2 Measuring setup**~~

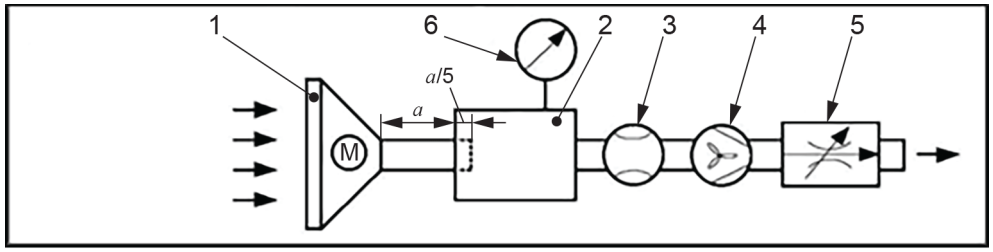
~~The maximum possible air outlet of the **cooking fume extractor** is connected to a pressure compensation chamber (see Figure 1). The duct diameter needs to be the same as that of the air outlet.~~

~~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.~~

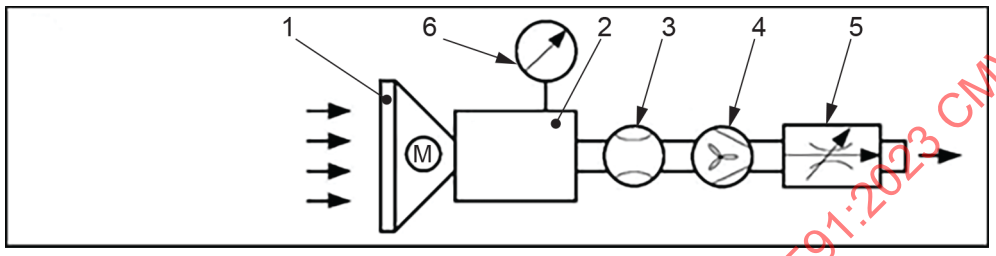
The air outlet of the **CFE** is connected to a pressure compensation chamber in accordance with Figure 1 and 6.2. For this, the inner diameter of the air outlet of the **CFE** shall be measured. The diameter of the connecting duct shall be determined in accordance with Table 3. The connecting duct shall be a rigid straight duct with smooth inner wall. A **CFE** without ducting, e.g. a **CFE** with **recirculation mode**, is connected directly to the pressure compensation chamber as shown in Figure 1b).

The pressure compensation chamber shall comply with the requirements stated in ISO 5801:2017, 9.5, with the following additional specification: the test chamber dimension D4 (see ISO 5801) shall be at least 750 mm. The distance J (see ISO 5801) can be either limited by a straightener or by the chamber wall with outlet area. **7**

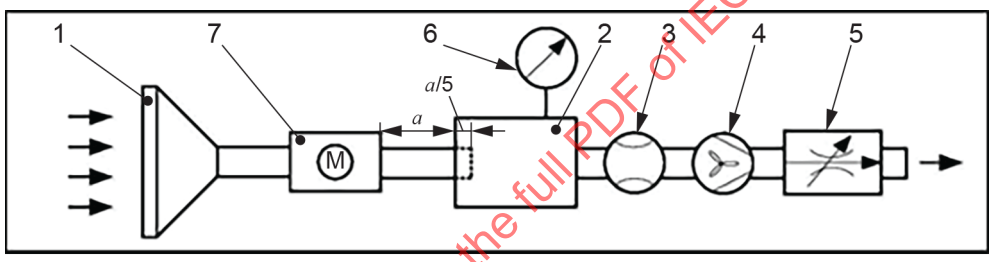
The pressure tapping point for the static pressure gauge shall have the half distance of J with a tolerance of ± 50 mm (see ISO 5801). If there is more than one pressure tapping point, all of them shall be at this distance around the chamber. Additionally, the measured values shall be averaged.



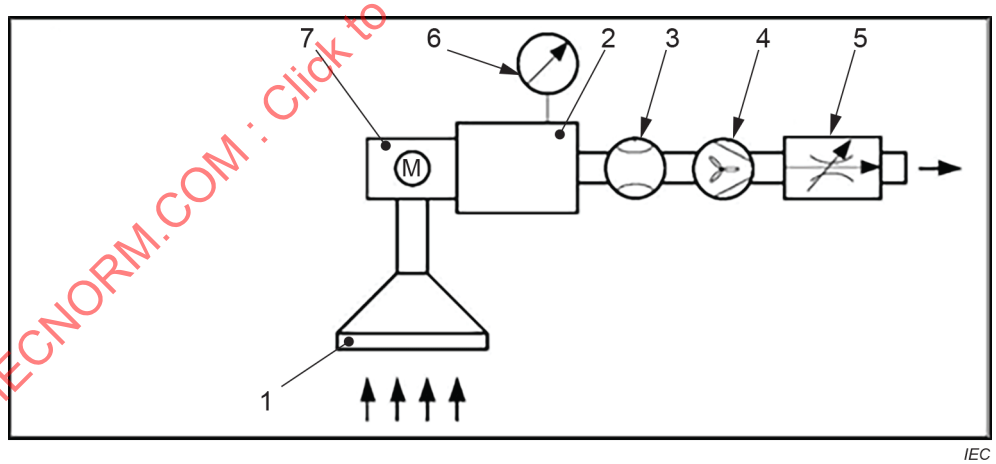
a) Setup for CFE with duct



b) Setup for CFE without duct



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



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

Key

a	5 times the inner diameter of the duct, which shall be sealed	4	auxiliary fan
1	**cooking fume extractor**	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

Follow the manufacturer's instructions regarding the distance between points 1 and 7, as shown in Figure 1c) and 1d). If there is no value for the distance given, then the distance a is used.

A **CFE** in **recirculation mode** can have air outlets with different geometries ~~as "air outlet areas"~~. These have to be adapted to the pressure compensation chamber.

For non-circular ducts, a virtual diameter ~~is considered~~ that represents the same cross-section is considered as the inner diameter of the air outlet.

The **grease filter** is installed for the test.

The **odour-reduction filter** is not installed for the test, except if the test is done in **recirculation mode**.

10.2 Measurement of the volumetric airflow

The **CFE** is operated at the **highest continuous setting for normal use** for at least 1 800 s for warming up.

The **CFE** is operated and, by suitably adjusting the auxiliary fan or the baffle, the airflow corresponding to various pressures can be determined.

The measurements are made with the controls positioned at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

The airflow in **recirculation mode** is determined when the static pressure in the compensation chamber is at ambient pressure. For the measurement of the grease absorption in **recirculation mode** in Clause 14, the pressure drop of the **odour-reduction filter** has to be determined.

The airflow in **extraction mode** is determined for discharge into a flue, which has the following pressure drop depending on the inner diameter of the air-outlet when there is an airflow of 200 m^3/h:

~~< 100 mm: 30 Pa b = 0,000 75~~
~~120 mm to 125 mm: 15 Pa b = 0,000 375~~
~~150 mm to 160 mm: 5 Pa b = 0,000 125~~
~~200 mm to 250 mm: 2,5 Pa b = 0,000 062 5~~
~~>250 mm: 1,25 Pa b = 0,000 031 25~~

Table 3 shows the parameter for the calculation of the resistance curve dependent on the measured inner diameter of the air-outlet in order to report the volumetric airflows for the used control settings. **8**

Table 3 – Parameters for the calculation of resistance curves –

Inner diameter d of the air outlet in mm	Diameter category D	Inner diameter of the connecting pipe in mm	b_D
≤ 110	100	100 ± 2	0,000 75
110 < d ≤ 135	125	125 ± 3	0,000 375
135 < d ≤ 175	150	150 ± 5	0,000 125
175 < d ≤ 225	200	200 ± 8	0,000 062 5
> 225	250	250 ± 10	0,000 031 25

NOTE 1 The assumption for the parameter b_D is given in Annex A. **9**

~~For determining the theoretical resistance curve for a flue pipe, the following formula is used:~~

~~$$y = b \cdot x^2$$~~

~~where~~

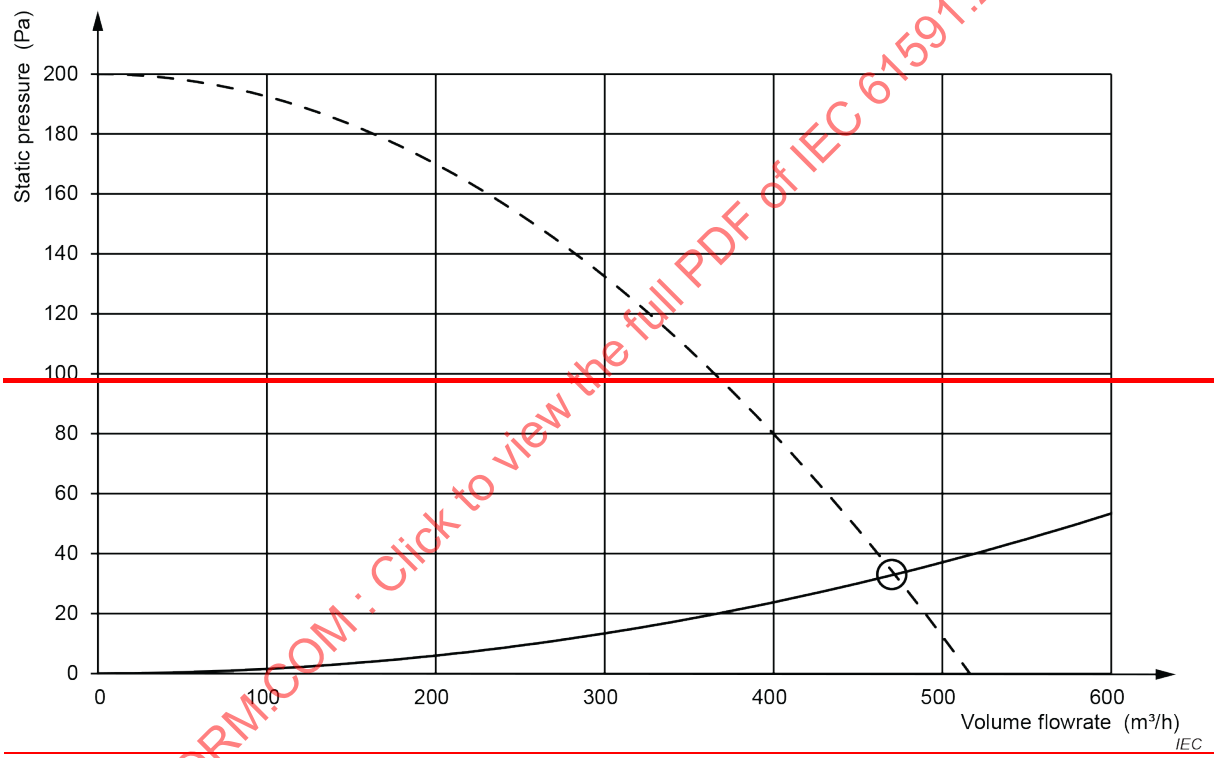
~~y is the numerical value of the pressure, expressed in Pa;~~

~~b is a value depending on the dimensions of the air outlet;~~

~~x is the numerical value of the airflow, expressed in m^3/h.~~

~~NOTE A pressure/airflow curve is determined for the appliance.~~

~~Figure 2 shows a reference resistance curve and a characteristic curve of a **cooking fume extractor**.~~



~~**Key**~~

~~— reference resistance curve of an exhaust duct with an inner diameter of 150 mm~~

~~- - - example characteristic curve of a **cooking fume extractor**~~

○ ~~**working point** (intersection of the duct pressure drop and the characteristic curve of the **cooking fume extractor**)~~

~~**Figure 2 – Example working point of a cooking fume extractor in extraction mode**~~

~~The airflow is stated for the **working point** at the **highest continuous setting for normal use**, at the lowest setting, and at the **boost position setting**, if any.~~

~~The **working point** is calculated to a reference density of 1,2 kg/m^3.~~

~~$$\Delta p_{CFE} = \Delta p_s \frac{\rho_{Ref}}{\rho_{Cha}}$$~~

where:

Δp_{CFE} is the reference pressure difference **cooking fume extractor**, in Pa;

Δp_s is the pressure difference in the chamber at test conditions, in Pa;

ρ_{Ref} is the reference air density of 1,2 kg/m^3;

ρ_{Cha} is the air density in the chamber at test conditions, in kg/m^3.

Alternative **working points** corresponding to other pressure drops may be specified instead, in which case the pressure drop has to be stated in the report.

10.4 Calculation of the fluid dynamic efficiency (FDE_{hood})

The calculation of the fluid dynamic efficiency (FDE_{hood}) is only possible for a **cooking fume extractor** in **extraction mode.**

For determining the fluid dynamic efficiency (FDE_{hood}) in accordance with 10.4, a pressure-airflow curve and the corresponding electric-power curve with a minimum of 25 measuring points over the whole range are determined (see Figure 3).

For the calculation, use the 6th degree polynomial and at least 10 measuring points, which are the interval 75 % to 125 % of the volume flow value at maximum energy efficiency. The measuring points should be well distributed over the range, whereby at least 5 measuring points of the volume flow has to be lower, and at a further 5 measuring points, the volume flow has to be higher than the volume flow of the calculated **best effiency point (BEP)**. The **BEP** is the maximum value of this regression curve.

For the calculation of FDE_{hood}, the measured data for the **boost position setting** is taken into account. If no **boost position setting** is available, then the **highest continuous setting for normal use** is taken into account.

The **BEP** is determined.

The fluid dynamic efficiency (FDE_{hood}) at the **BEP** (see Figure 3) is calculated with the following formula, and is rounded to one decimal place:

$$FDE_{hood} = \frac{Q_{BEP} \cdot \Delta p_{BEP}}{3\,600 \cdot P_{BEP}} \times 100$$

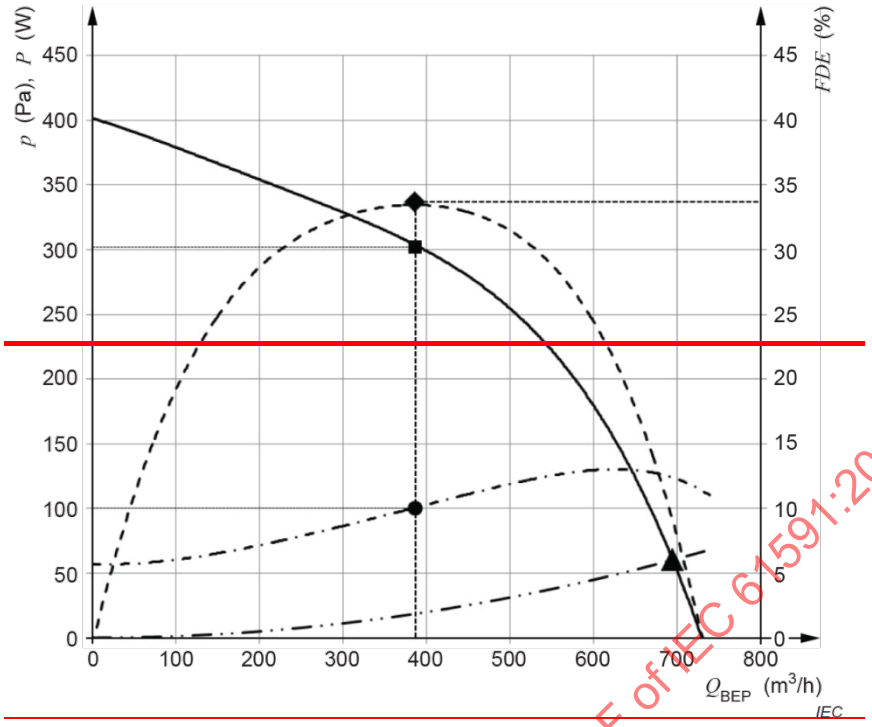
where:

Q_{BEP} is the numerical value of the airflow at the **best efficiency point**, expressed in m^3/h and rounded to the first decimal place;

Δp_{BEP} is the numerical value of the difference static pressure at the **best efficiency point**, expressed in Pa and rounded to the nearest integer;

P_{BEP} is the numerical value of the electric power consumption at the **best efficiency point**, expressed in W and rounded to the first decimal place.

The values in the formula are not calculated in relation to the reference air density.



Key

– ·· –	resistance curve of an exhaust duct	▲	Working point
■	pressure at BEP	●	electric power at BEP
– · –	electric power curve	– – – –	FDE curve
◆	BEP	——	pressure/airflow curve

Figure 3 – Example diagram of the best efficiency point (BEP)

For determining the theoretical resistance curve for a flue pipe, the following formula is used:

$$\Delta p = b_D \times Q^2 \quad (1)$$

where

Δp is the numerical value of the pressure, expressed in Pa;

b_D is a value representing a diameter category;

Q is the numerical value of the airflow, expressed in m³/h.

NOTE 2 A pressure/airflow curve is determined for the appliance.

10.3 Calculation of the volumetric airflow

Volume flow rate $Q_{s,D}$ at $WP_{s,D}$ defined at the intersection of the respective regression line and the resistance characteristics:

$$\text{Respective linear regression: } \Delta p_{C_{s,D}} = c_{s,D} \times Q_{s,D} + d_{s,D} \quad (2)$$

Resistance characteristics: $\Delta p_{C_{s,D}} = b_D \times Q_{s,D}^2$ (3)

$$0 = -b_D \times Q_{s,D}^2 + c_{s,D} \times Q_{s,D} + d_{s,D} \quad (4)$$

where

$WP_{s,D}$ is the **working point** at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any, depending on the diameter category;

$\Delta p_{C_{s,D}}$ is the density corrected relative pressure in the chamber at reference density in Pa;

$Q_{s,D}$ is the numerical value of the airflow in m^3/h;

$c_{s,D}$ $d_{s,D}$ are polynomial coefficients to each respective polynomial;

b_D is the defined variable representing the diameter category, see Table 3.

The volumetric airflow is reported for the working points at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

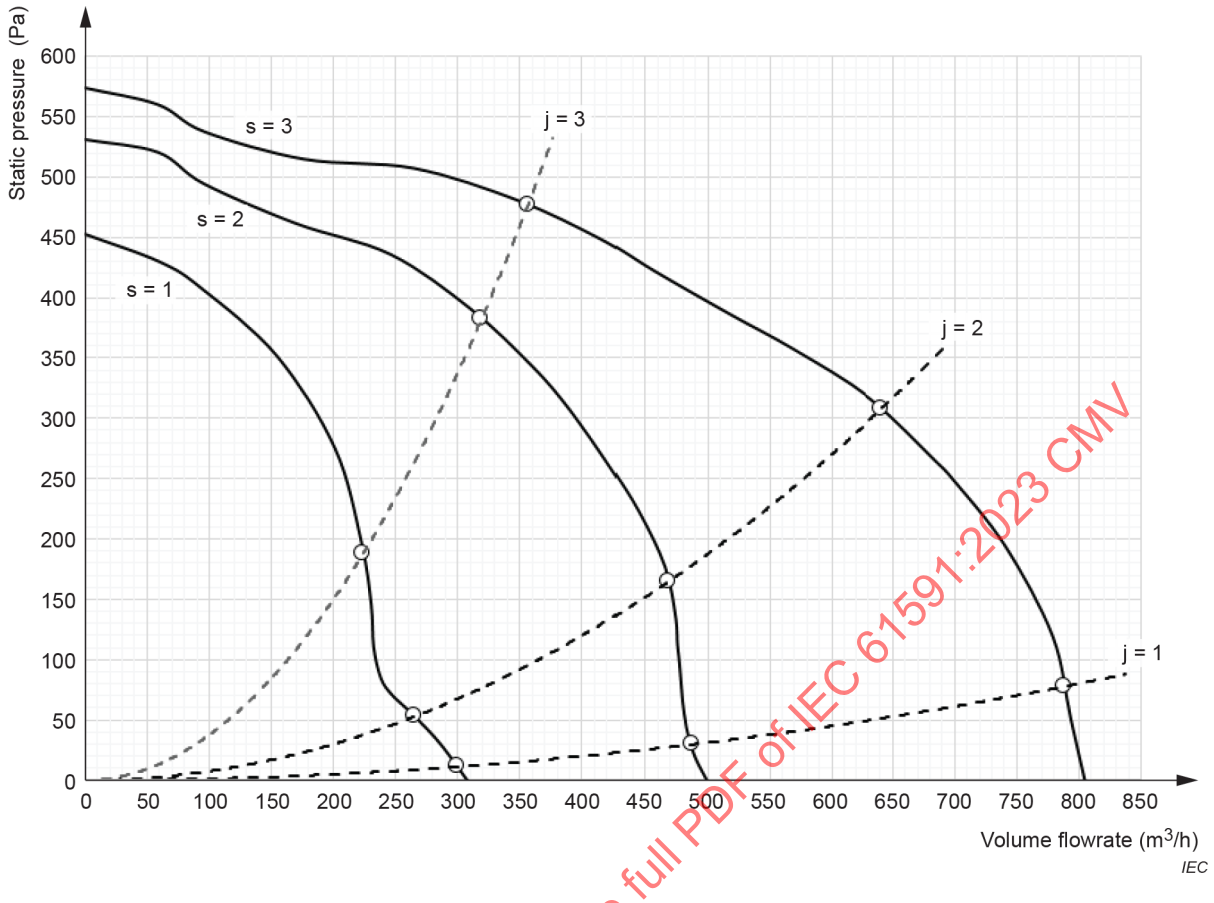
11 Fluid dynamic efficiency 10

11.1 Purpose

The purpose of this test is to determine the fluid dynamic efficiency taking into account **highest continuous setting for normal use**, the **lowest setting**, the **boost position setting,** if any, and different pressure drops representative for different ducting.

11.2 Determining the working points

The measurement setup described in 10.1 shall be used. 11



Key

s=1 pressure/airflow curve of a **CFE** at **lowest setting**

s=2 pressure/airflow curve of a **CFE** at **highest continuous setting for normal use**

s=3 pressure/airflow curve of a **CFE** at **boost position setting**

j=1 resistance curve of a ducting system with low losses

j=2 resistance curve of a commonly used ducting system

j=3 resistance curve of a ducting system with high losses

○ working point (intersection of the duct pressure drop and the characteristic curve of the **CFE**)

Figure 2 – 9 working points of a cooking fume extractor in extraction mode (example)

The resistance curves in Figure 2 are determined, independent of the inner air outlet diameter of the **CFE** under test as follows:

$j = 1$

– $j = 1$ represents a resistance curve of a ducting system with low losses.

– The resistance curve is calculated with Equation (1), where $b = 0{,}000\ 375$ (corresponds to a theoretical resistance curve for a flue pipe with 15 Pa at 200 m^3/h).

$j = 2$

– $j = 2$ represents a resistance curve of a commonly used ducting system.

– The resistance curve is calculated with Equation (1), where $b = 0{,}000\ 75$ (corresponds to a theoretical resistance curve for a flue pipe with 30 Pa at 200 m^3/h)

$j = 3$

– $j = 3$ represents a resistance curve of a ducting system with high losses.

– The resistance curve is calculated with Equation (1), where b = 0,003 75 (corresponds to a theoretical resistance curve for a flue pipe with 150 Pa at 200 m^3/h).

The airflow is measured at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

For warming up, the **CFE** is operated at the setting which is under test until steady operation is ensured.

Measuring points per pressure/airflow curve shall be measured at steady operation, where the interval in between two points shall be ≤ 25 m^3/h and ≤ 25 Pa. **12**

These requirements on the measuring points shall be fulfilled only for the measuring points selected for calculation (see 10.3).

For each measuring point, the electric power consumption shall be reported. Additionally, the order of measurements applied shall be reported.

11.3 Calculation of the fluid dynamic efficiency (FDE)

11.3.1 Conversion to reference air density

11.3.1.1 Relative static pressure

The static pressure shall be converted to a reference density of 1,2 kg/m^3 according to Formula (5):

$$\Delta p_{C_{s,j}} = \Delta p_{Cha} \frac{\rho_{Ref}}{\rho_{Cha}} \quad (5)$$

where:

Δp_{Cha} is the relative pressure in the chamber at test conditions, in Pa;

$\Delta p_{C_{s,j}}$ is the density corrected relative pressure in the chamber at reference density, in Pa;

ρ_{Ref} is the reference air density of 1,2 kg/m^3;

ρ_{Cha} is the air density in the chamber at test conditions, in kg/m^3.

11.3.1.2 Electric power consumption

The electrical power consumption shall be converted to reference density of 1,2 kg/m^3 according to Formula (6):

$$P_C = P_{Cha} \frac{\rho_{Ref}}{\rho_{Cha}} \quad (6)$$

where:

P_{Cha} is the electric power consumption in the chamber at test conditions, in W;

P_C is the density corrected electric power consumption at reference density, in W;

ρ_{Ref} is the numerical value of the reference air density of 1,2 kg/m^3;

ρ_{Cha} is the air density in the chamber at test conditions, in kg/m^3.

11.3.2 Calculating the corrected working points $WP_{C_{s,j}}$

The volumetric airflow, the static pressure and the electric power consumption at the working points of the three pressure/airflow curves s = 1, 2, 3 and the three resistance curves j = 1, 2, 3 of the **CFE** shall be calculated.

If the **CFE** is not fitted with a **boost position setting**, then the working points $WP_{C_{s,j}}$ of s = 2 are equal for s =3.

The working points shall be calculated by the measured points per pressure/airflow curve (see 10.3) and the corresponding electric power consumption. The calculation shall be done for each of the 9 working points; see Figure 2.

a) Selecting the measured points

Two measured points shall be selected for each working point, with one of these points lying above and one of these points lying below the working point to be determined, i.e. the differential pressure Δp of the respective working point.

b) Calculating the regression lines

With the two selected measured points the respective regression lines shall be calculated by a linear regression for the pressure/airflow curve and for the electric power consumption.

c) Calculating the working point $WP_{s,j}$

$WP_{s,j}$ is defined as the intersection of the respective regression line and its resistance characteristics, i.e. it is defined by $Q_{s,j}$, $\Delta p_{C_{s,j}}$ and $P_{C_{s,j}}$.

Respective linear regression:
$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (7)$$

Resistance characteristics:
$$\Delta p_{C_{s,j}} = b_j \times Q_{s,j}^2 \quad (8)$$

$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} = b_j \times Q_{s,j}^2 \quad (9)$$

where

$Q_{s,j}$ is the numerical value of the airflow, in m^3/h;

$c_{s,j}$, $d_{s,j}$ are polynomial coefficients to each respective polynomial;

b_j is the defined variable representing three discrete diameter categories (see 10.3).

a) Volume flow rate $Q_{s,j}$ at $WP_{s,j}$

$$0{,}001 \geq -b_j \times Q_{s,j}^2 + c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (10)$$

b) Density corrected difference static pressure at $WP_{s,j}$

$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (11)$$

c) Density corrected electric power consumption at $WP_{s,j}$

$$P_{C_{s,j}} = e_{s,j} \times Q^{1}_{s,j} + f_{s,j} \quad (12)$$

where

$P_{C_{s,j}}$ is the density corrected electric power consumption at $WP_{s,j}$

$e_{s,j}, f_{s,j}$ are polynomial coefficients of each respective linear function.

11.3.3 Calculating the fluid dynamic efficiency (FDE)

The calculation of the fluid dynamic efficiency (FDE) is only possible for a **CFE** in **extraction mode**.

The FDE for each pressure/airflow curve s =1, 2, 3 is calculated according to Formula (13):

$$FDE_s = \frac{1}{3} \sum_{j=1}^{3} \frac{\Delta p_{C_{s,j}}}{3600} \times \frac{Q_{s,j}}{P_{C_{s,j}}} \quad (13)$$

where

FDE_s is the fluid dynamic efficiency for the corrected pressure/airflow curve s;

$\Delta p_{C_{s,j}}$ is the density corrected relative pressure in the chamber at reference density;

$Q_{s,j}$ is the numerical value of the airflow, in m^3/h;

$P_{C_{s,j}}$ is the density corrected electric power consumption at $WP_{s,j}$.

The fluid dynamic efficiency FDE is calculated by summing the FDE_s, in accordance with Formula (14):

$$FDE_{CFE} = \sum_{s=1}^{3} \frac{t_s}{t_1 + t_2 + t_3} \times FDE_s \quad (14)$$

where

FDE_{CFE} is the fluid dynamic efficiency of CFE corrected to reference air density, rounded to first decimal place;

t_1 is the running time for s = 1, t_1 = 20 min;

t_2 is the running time for s = 2, t_2 = 30 min;

t_3 is the running time for s = 3, t_3 = 10 min;

t_s is the partial time per stage in min.

NOTE The running time is related to average household use.

12 Effectiveness of the lighting system

12.1 Purpose

This method is used to assess the effectiveness of the **lighting system** of **CFE**.

12.2 Measurement

The **lighting system** of the **cooking fume extractor** is operated for at least 1 800 s for warming up.

The test is carried out in a room in which all other light sources are extinguished. During the test, only the **lighting system** of the **CFE** is on.

The electric power input of the **lighting system** (P_L) is determined by measuring the electric power input of the whole **CFE** while only the **lighting system** is turned on. P_L is stated in W and rounded to the first decimal place.

NOTE P_L includes losses at the transformer or other electronic components.

To avoid reflections, all adjacent surfaces, including the backwall and the cooking appliance, are covered, extended by at least 500 mm on both the left-hand and right-hand sides of the measurement area with a sheet of matt-black painted plywood or similar board.

The distance as determined in 6.2 is the distance between the **cooking fume extractor** mounted and the aperture of the illuminance measurement device.

The number and positioning of the measurement points is defined in Table 4 according to the width W of the **cooking fume extractor**. The maximum width in accordance with 7.1 applies. The positions of the measurement points are determined in Figure 3, whereby the measurement points 1, 2 and 3 show the centreline of the **cooking fume extractor**.

Table 4 – Relevant measurement points for assessing the effectiveness of the lighting system

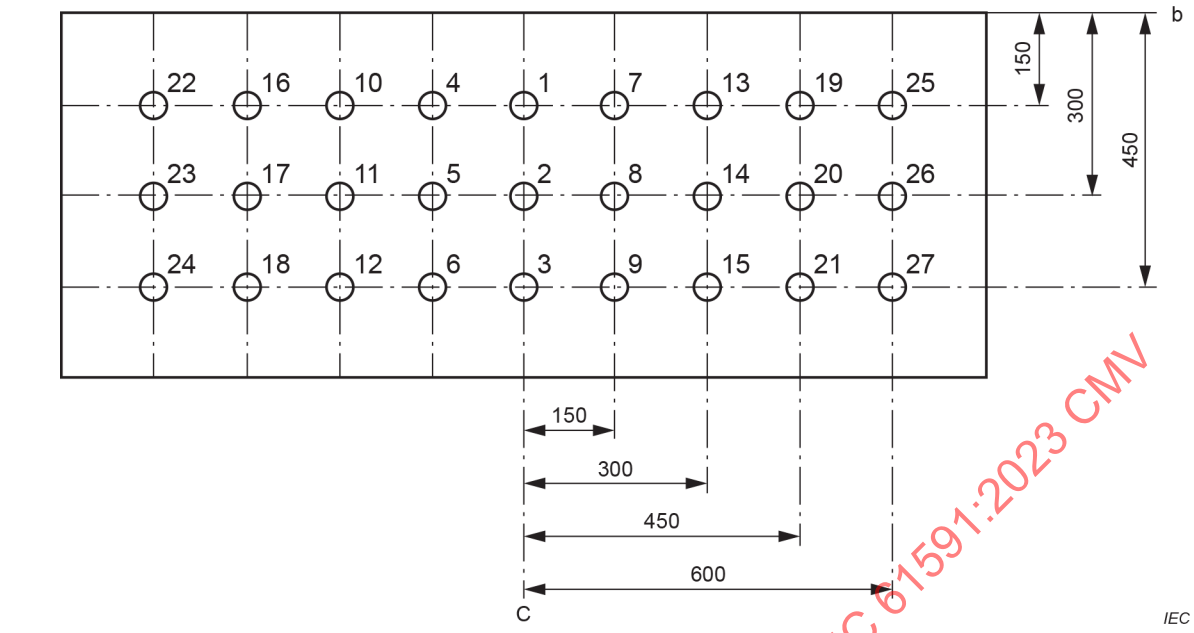
Width (W) of cooking fume extractor (see 7.1) mm	**Relevant measurement points (see Figure 3)**
W < 800	1 to 9
800 ≤ W < 1 050	1 to 15
1 050 ≤ W < 1 300	1 to 21
W ≥ 1 300	1 to 27

The centre of **island range hoods** and **ceiling range hoods** ~~has to~~ shall be in line with measurement point 2 (see Figure 3).

Wall range hoods, **built-in range hoods** and **microwave hood combinations** are mounted on the wall of the test room. The baseline of the measurement panel in Figure 4 is aligned to the wall of the test room.

The illuminance for each measurement point is stated in lux and rounded to the nearest integer.

Dimensions in millimetres



Key

C centre line defined by the measurement points 1, 2 and 3

b baseline

◯ measurement points

Figure 3 – Measurement points for assessing the effectiveness of the lighting system

12.3 Assessment

The arithmetic average of the measurement points under test is calculated, and this value is stated as the **illumination** E_{middle} in lux, rounded to the nearest integer.

13 Odour reduction

13.1 Purpose

This method is used to assess the effectiveness of **odour-reduction filter**(s) of **CFE**s operated in **recirculation mode**.

NOTE The method is not used for **cooking fume extractors** operated in **extraction mode,** because odour-reduction filters are not used in **extraction mode**.

13.2 Measuring setup

The test is carried out in a sealed room having a volume of (22 ± 2) m^3, the walls of which are impervious to methyl ethyl ketone (MEK). The response time of the system is measured by placing an easily detectable amount of MEK directly at the entrance of a sampling point and measuring the time until it is detected. The response time is added to all measurements where the information arrives delayed by this time.

An electric hob is installed along one of the longer walls of the room together with kitchen cabinets. The kitchen cabinets and wall cabinets shall be sealed from the rest of the air in the test room. The room is considered to be adequately sealed if the concentration of MEK in the room drops by less than 5 % 60 min after the solution has been distributed.

CFEs, except **down-draft systems**, are installed centrally above the electric hob, at a height of (600 ± 10) mm. On both sides, wall cabinets are mounted.

Island range hoods and **ceiling range hoods** are installed also at a height of (600 ± 10) mm above the electric hob, but not centrally. They are installed with a distance to the wall of (200 ± 5) mm. No wall cabinets ~~on both sides~~ are ~~not~~ mounted on either side.

Down-draft systems ~~have to~~ shall be installed in accordance with the manufacturer's instructions. Wall cabinets are not mounted.

The room and the kitchen furniture, together with the layout, are shown in Figure 4.

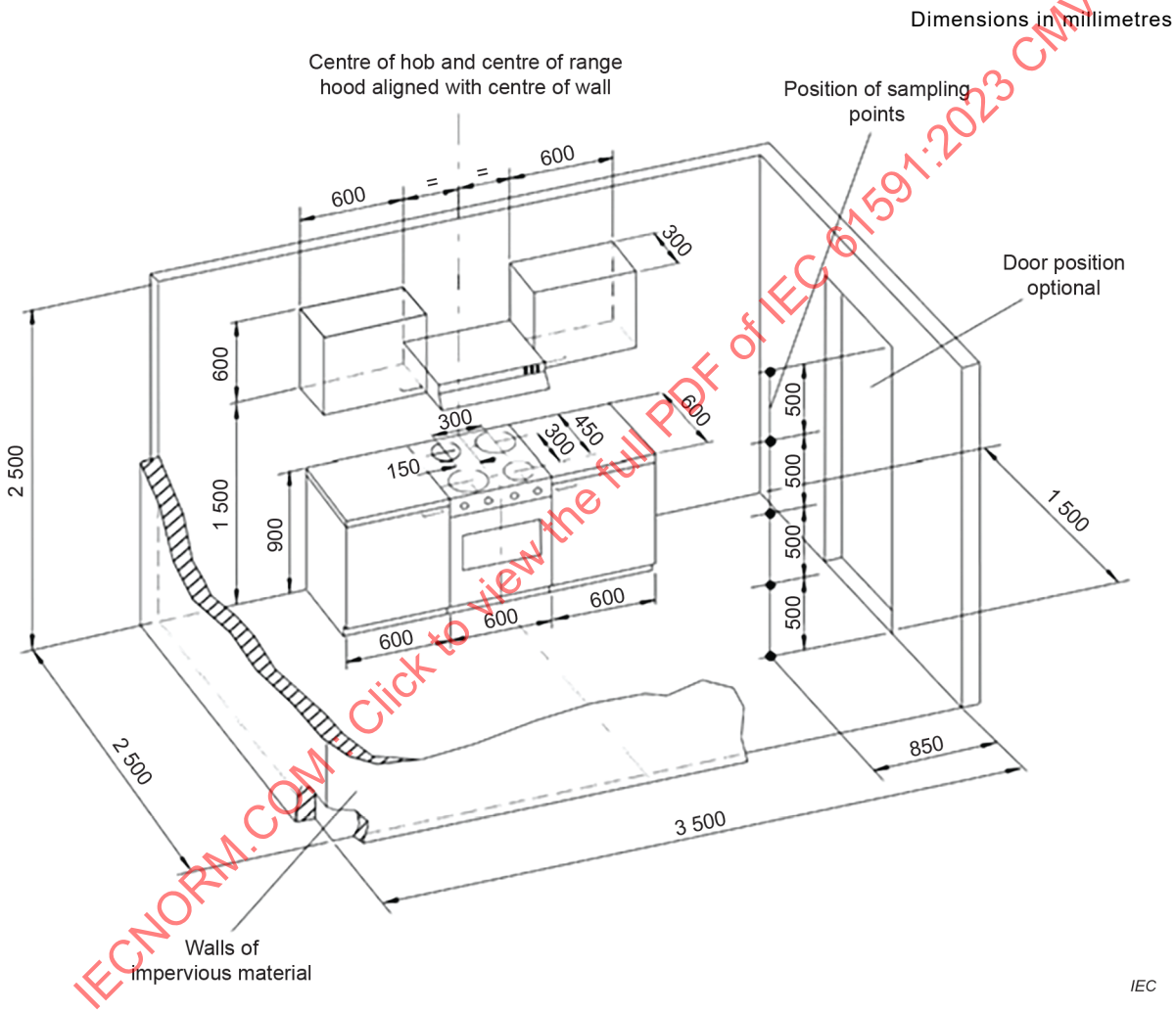


Figure 4 – Example of a test room

~~NOTE 1~~ When handling MEK, normal precautions have to be taken. **13**

The characteristics of the test room are established without the **cooking fume extractor** being operated. The same cookware as specified in Clause 14 is placed on the front left-hand cooking zone, matching the size of the cooking zone as well as possible. For the placing of cookware on a **down-draft system**, see Figure 6. However, it may vary by a maximum of ±20 mm. If an electric hob element is used, the height of the hob element and the cookware shall not exceed 205 mm.

Following the description in Clause 14, a thermocouple is mounted on the cookware.

The temperature in the bottom of the cookware shall be maintained at (170 ± 10) °C.

A solution containing (12 ± 0,1) g of methyl ethyl ketone (MEK) in (300 ± 1) g of demineralised water is continually dripped onto the cookware at such a rate that all the solution has been used after (1 800 ± 10) s plus response time. The solution is evenly dispersed throughout the room by means of a fan. The concentration of MEK in the room C_1 is measured (1800 ± 10) s after the dripping started. For this, the concentration of MEK is detected using four sampling points each separated by (500 ± 10) mm vertically, as shown in Figure 5. The detection equipment for measuring the MEK concentration is located outside the room. PTFE tubes with an inner diameter of (2,0 ± 0,2) mm of equal length and connected to each other are suitable to link the sampling points to the measuring equipment.

Between the sampling point and the detection equipment for measuring the MEK, in case of condensation, the tubes should be heated and controlled to avoid condensation. **14**

NOTE Flame ionization equipment is suitable for measuring the concentration of MEK.

The room is ventilated until the concentration of MEK is less than 1 % of C_1.

The **CFE** is operated at the **highest continuous setting** for normal use for at least 1 800 s for warming up.

The **odour-reduction filter(s)** are conditioned by heating at (50 ± 5) °C for at least 16 h. Then they are mounted into the warmed up **CFE**.

13.3 Measurement

The **CFE** is operated with any fan control adjusted to the **highest continuous setting for normal use** immediately after warming up. The MEK solution is dripped into the heated cookware so that (312 ± 1,5) g has been evaporated within (1 800 ± 10) s. The concentration of MEK C_2 in the room is measured (1 800 ± 10) s plus response time after the dripping started.

The **CFE** is operating while the time for the concentration of MEK to fall from C_2 to 15 % of C_1 is taken. This time is stated as **odour dispersion time** in min. If the concentration of 15 % of C_1 is not reached after 60 min of dispersion time, the measurement is stopped.

C_1 and C_2 are rounded to the nearest integer and noted in parts per million.

13.4 Calculation of the odour reduction factor

The **odour reduction factor** O_f is calculated in per cent as follows:

$$O_f = \frac{C_1 - C_2}{C_1} \times 100\% \quad (15)$$

where

C_1 is the concentration of MEK at the end of the test without operating the **cooking fume extractor**;

C_2 is the concentration of MEK at the end of the test while operating the **cooking fume extractor**.

The **odour reduction factor** rounded to the first decimal and the **odour dispersion time** are stated.

14 Grease absorption

14.1 Purpose

This test is used to measure the efficiency of the **grease filter**.

The **grease filter** includes all detachable coverings, filter frames, plates or supports, which are intended to be removed for cleaning without tools.

14.2 Measuring setup

All tests are carried out with identical new or cleaned filters and with a new or cleaned **CFE** and clean cookware.

A chamber in accordance with Figure 5 and Figure 6 is used fitted with an absolute filter having a collecting efficiency of at least 99,995 %. The frame of the absolute filter shall not pick up any humidity. Its sides are sealed to the walls of the chamber. ~~It has to be ensured that The equipment under test shall achieve the airflow of the **working point**.~~ The equipment under test shall achieve the airflow at **highest continuous setting for normal use** in accordance with 10.3.

The air outlet from the chamber is connected to an auxiliary fan for controlling the pressure. The arrangement is shown in Figure 5 and Figure 6.

For a **range hood** or a **microwave hood combination**, a suitable electric hob element is positioned in accordance with 6.2. For a **down-draft system**, a suitable electric hob element is placed in accordance with Figure 6.

On this hob element, a piece of cookware (see Figure 7) with the following specifications is centrally positioned:

– outer bottom diameter (200 ± 20) mm;
– height (125 ± 20) mm;
– uncoated;
– thickness of bottom (7 ± 1) mm;
– flatness of the bottom inside the cookware at ambient room temperature ≤ 0,2 mm (convex);
– material: stainless steel.

The diameter of the electric hob element shall match the diameter of the cookware as well as possible. However, it may vary by a maximum of ±20 mm. The height of the electric hob element and the cookware shall not be higher than 205 mm.

In the bottom of the cookware, a thermocouple or temperature sensor in accordance with 6.6 is mounted as shown in Figure 7. The thermocouple or temperature sensor shall be in contact with the bottom of the cookware.

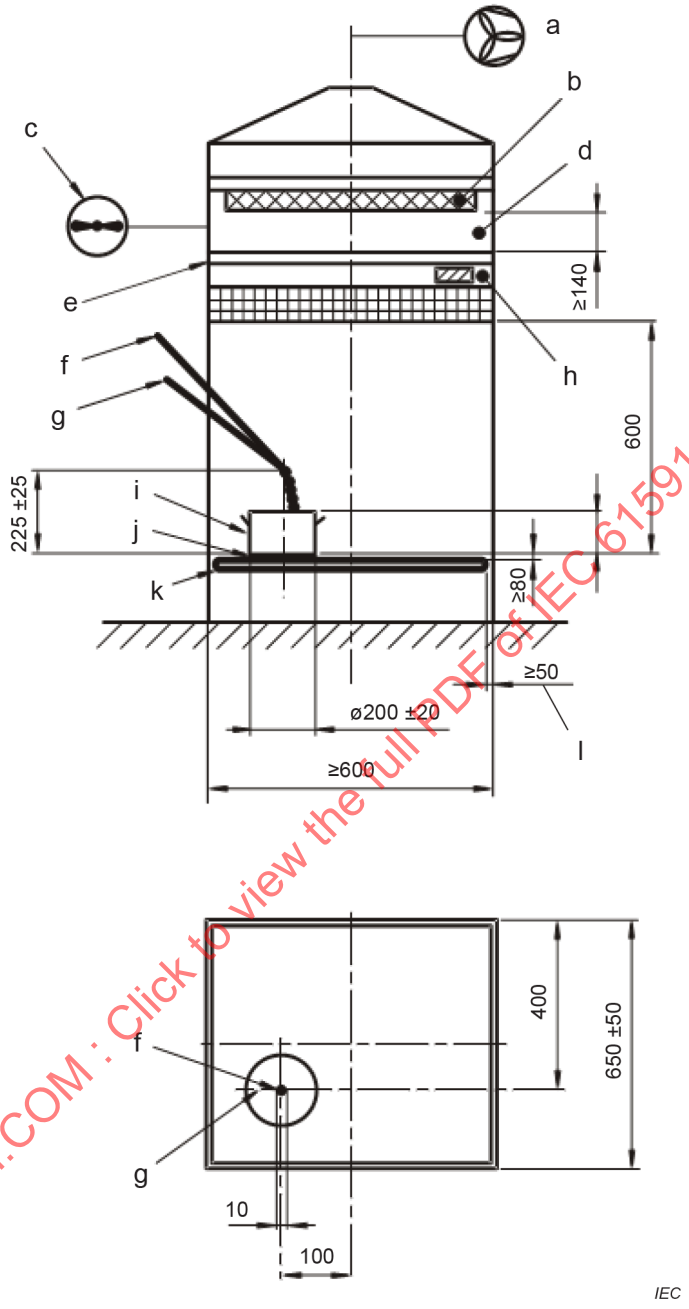
The electric hob element is operated in such a way that the temperature in the bottom of the cookware is maintained at a temperature of (250 ± 5) °C.

During the measurement, oil and water are dripped on the hot cookware. The points from which the oil and water are dripped are (10 ± 0,5) mm apart. The position of the cookware and means for supplying the oil and water is also shown in Figure 5 and Figure 6.

Refined and fresh corn oil shall be used with a temperature of (23 ± 2) °C. Demineralised water shall be used with a temperature of (23 ± 2) °C.

NOTE A possible supplier for corn oil is Mazola Keimöl[1].

Dimensions in millimetres



[1] Mazola Keimöl is the trade name of a product supplied by Peter Kölln GmbH&Co. KGaA. Mazola Keimöl might be commercially available by other suppliers after the date of publication of this document. This information is given for the convenience of the users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products ~~may~~ can be used if they can be shown to lead to the same results.

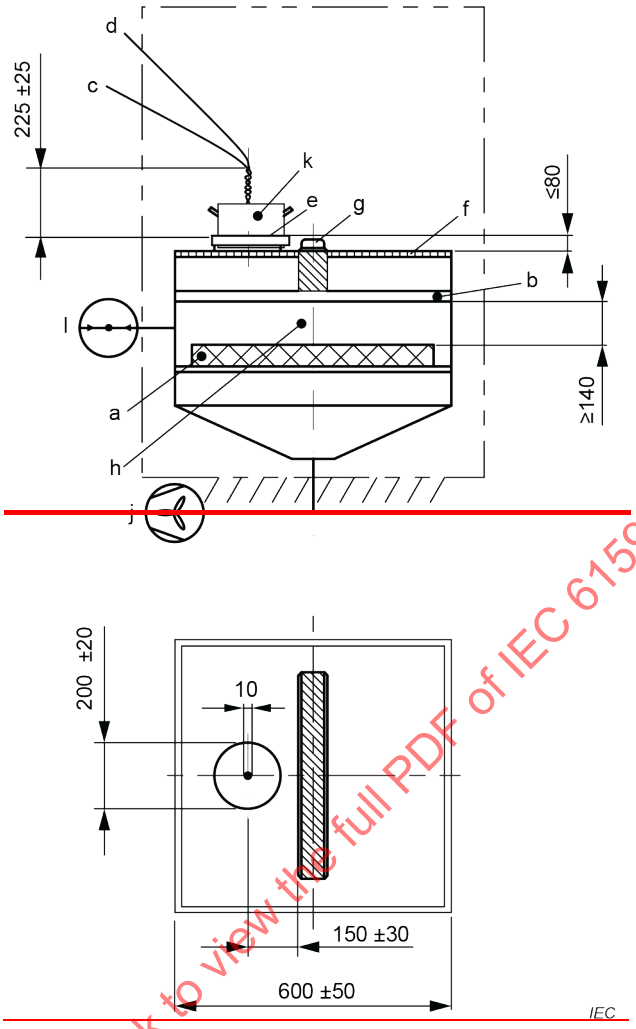
Key

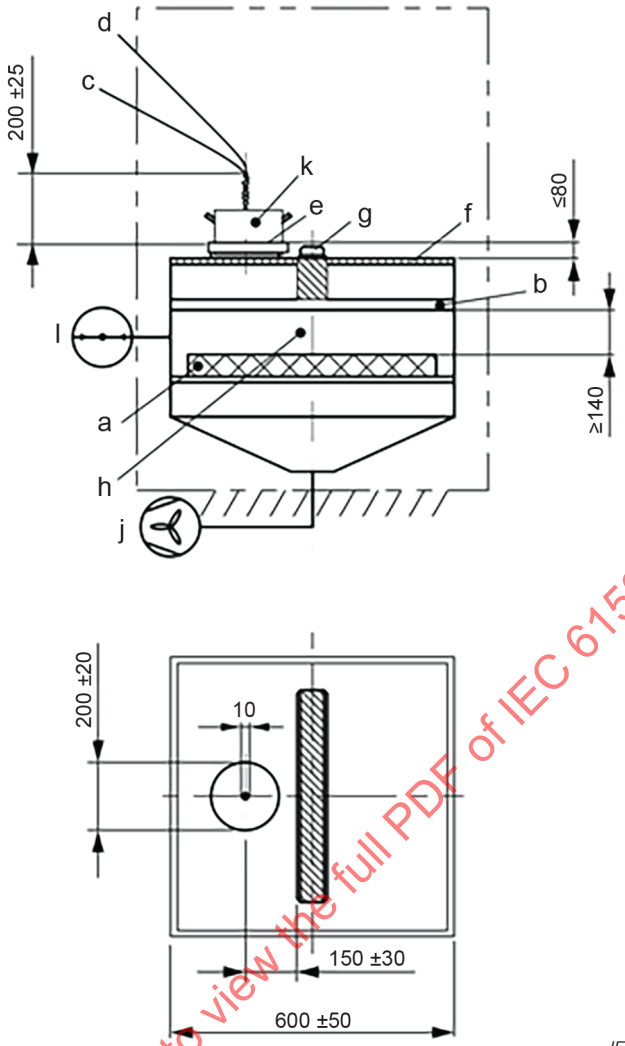
a	variable auxiliary fan	g	dosing pump for adding drops of corn oil
b	absolute filter with removable filter insert	h	**range hood**
c	pressure gauge	i	cookware
d	compensation chamber	j	electric hob
e	intermediate shelf with openings according to the outlet of the hood	k	vertically adjustable table
f	dosing pump for adding drops of distilled water	l	minimum 50 mm gap around vertically adjustable table

Distance between the **cooking fume extractor** and the adjustable table in accordance with 6.2.

Figure 5 – Chamber for the grease absorption of a range hood or a microwave hood combination

Dimensions in millimetres





a absolute filter with removable filter insert
b intermediate shelf with opening according to the outlet of the equipment under test
c dosing pump for adding drops of demineralised water
d dosing pump for adding drops of corn oil
e suitable electric hob element
f desk
g down-draft system
h compensation chamber
j external blower
k cookware
l pressure gauge

Figure 6 – Chamber for the grease absorption of a down-draft system

Dimensions in millimetres

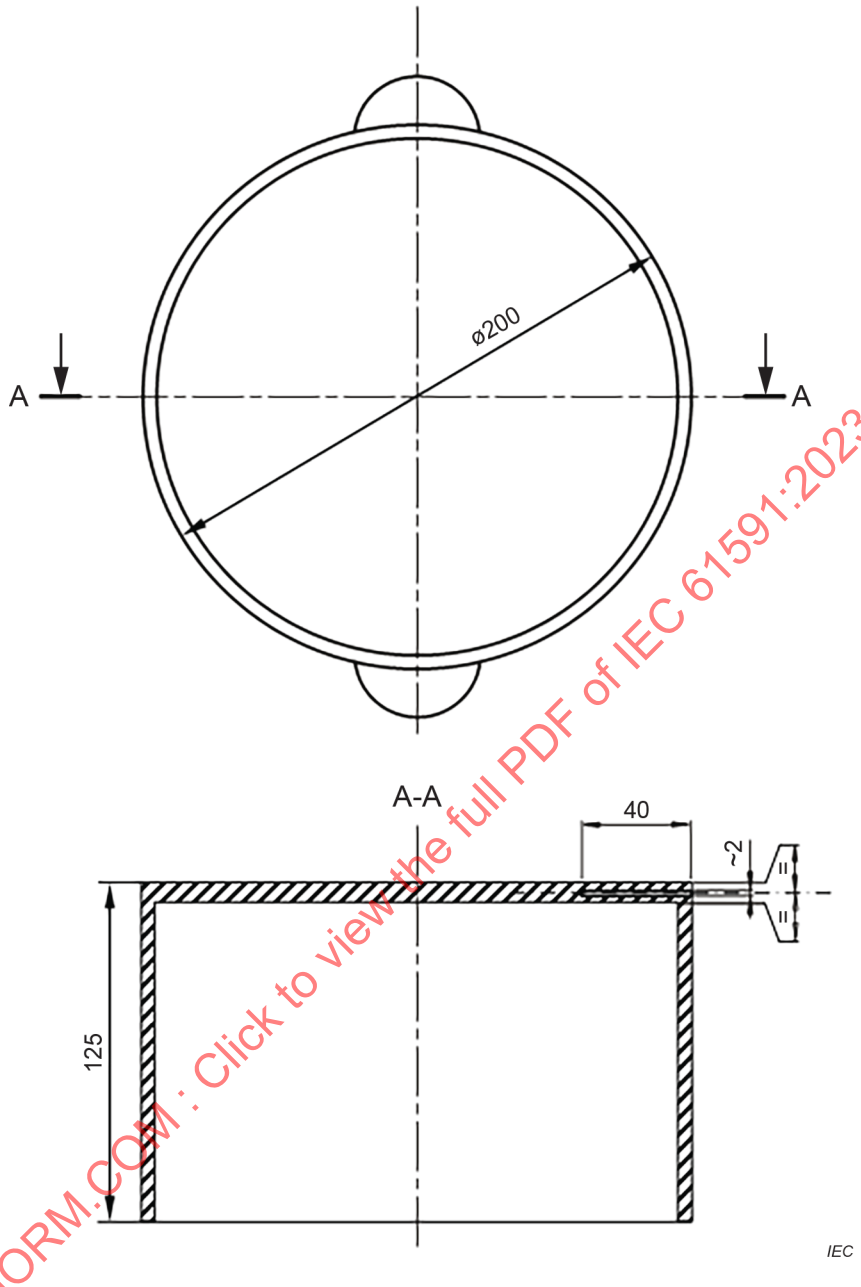


Figure 7 – Cookware used for measuring the grease absorption

14.3 Preparation

14.3.1 Determining the mass

The test is to be performed without the **odour-reduction filter**(s).

The mass of the **CFE** is measured without the **grease filter**(s) and without the **odour-reduction filter**(s).

To dry the **grease filter(s)**, they are placed in a pre-heated cabinet for at least 60 min at a temperature of (50 ± 5) °C continuously. The mass of the **grease filter**(s) is determined separately, immediately after drying.

The absolute filter (see Figure 5 and Figure 6) is placed in a pre-heated cabinet for at least 60 min at a temperature of (50 ± 5) °C continuously. The mass is determined immediately after drying. In the event of a doubt, the absolute filter is dried for a further 3 h during which time the mass should not reduce by more than 0,5 g.

The mass of the **CFE**, the **grease filter**(s) and the absolute filter is rounded to ±0,1 g and stated.

14.3.2 Warm-up period

The **CFE** with the mounted and weighed filter(s) is installed in the chamber fitted with the mounted and weighed absolute filter in accordance with Figure 5 and Figure 6, the arrangement being such that the air in the chamber has to pass through the **CFE**.

In the case of a **multiple combination hood** and a **down-draft system** with a separately mounted fan, the fan does not need to be mounted during the grease absorption test. The desired airflow rate can instead be achieved by using the auxiliary fan and by controlling the airflow with a suitable device.

The **CFE** is operated at the **highest continuous setting for normal use** for at least 1 800 s.

14.3.3 Determining the working point *WP*

The working point *WP* determined in Clause 10 for the **highest continuous setting for normal use**, related to the measured inner air outlet, shall be applied.

14.4 Measurement

Before starting the measurement, the cookware is preheated to the required temperature of (250 ± 5) °C.

If this temperature is reached, the **CFE** is operated with any fan control adjusted to the **highest continuous setting for normal use**.

At the same time, (48 ± 1) ml of corn oil per 1 800 s and (69 ± 1) ml of demineralised water per 1 800 s are dripped onto the heated cookware continuously. The nozzle diameter is (2,8 ± 0,1) mm.

In **extraction mode**, the auxiliary fan is adjusted and controlled to the **working point** *WP* ~~linked to the largest diameter the **cooking fume extractor** allows in delivery condition~~. For this, the variable auxiliary fan is turned on and set to the pressure in Pa measured in accordance with Clause 10.

In **recirculation mode**, the auxiliary fan is adjusted and controlled to the pressure drop determined in Clause 10 with the **odour-reduction filter**(s) mounted.

The test is carried out for 1 800 s ± 10 s, after which the supply of oil and water is stopped and the electric hob is switched off. The **cooking fume extractor** and the auxiliary fan are switched off (600 ± 10) s later.

14.5 Assessment

The **CFE** is weighed again after removal of the **grease filter** and the mass of oil retained is determined. Oil that drips from the appliance during the measurement procedure is not taken into account. Oil that drips from the appliance after the measurement procedure is added to w_r.

The **grease filter** and absolute filter are placed in a drying cabinet again for at least 60 min at a temperature of (50 ± 5) °C continuously. Afterwards, they are weighed immediately and the mass of the oil they contain is determined.

Oil that drips from the filters during the drying process is added to w_g.

For **down-draft systems** integrated in a cooking appliance, the oil that is on the surface of the cooking appliance is not added to w_r.

The masses are measured to ±0,1 g.

The **grease absorption factor** G_{FE} is calculated in percent as follows:

$$G_{FE} = \frac{w_g}{w_r + w_t + w_g} \times 100\% \quad (16)$$

where

w_g is the mass of oil, in g, in the **grease filter**, including all detachable parts;

w_r is the mass of oil, in g, retained in the airways of the **CFE** and oil retained in ducting used in the chamber(s) to connect the **CFE** to the compensation chamber (see Figure 5 and Figure 6);

w_t is the mass of oil, in g, retained in the absolute filter.

The **grease absorption factor** G_{FE} is rounded to the first decimal place.

The test is carried out twice, and the average **grease absorption factor** is stated.

Annex A
(informative)

Assumption for the parameter b (see Table 3)

This Annex explains the assumptions made to calculate the parameter b.

Figure A.1 shows a ducting system with low losses.

Dimensions in metres

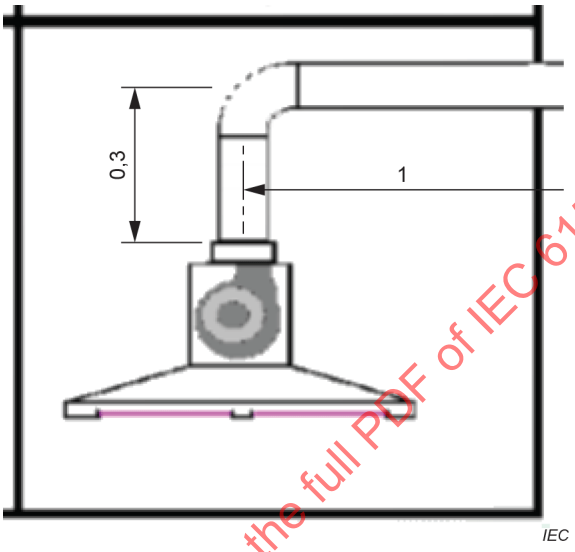


Figure A.1 – Typical ducting

The resistance curve in this document is based on a ducting with a 0,3 m pipe, a 90° elbow and a 1 m pipe.

Annex B
(normative)

Low power mode measurements

Table B.1 – Step by step instruction for measuring low power modes

Mode/ condition		Type of appliance: step	Appliance without network standby	Appliance with network standby	Measured parameter	Reference
standby and off mode	not connected to network (deactivate network connection if activated)	1	connect appliance to power supply	connect appliance to power supply		8.2.2 8.2.3
		2	wait at least 15 min	wait at least 15 min		
		3	appliance is in **off mode** or **standby mode**	appliance is in **off mode** or **standby mode**		
		4	measure power consumption	measure power consumption	standby mode: P_{sm} or **off mode**: P_{om}	
		5	turn on appliance	turn on appliance		8.2.2 8.2.3
		optional	complete (any) active mode	complete (any) active mode	description in test report	
		6	appliance interaction[b]	appliance interaction[b]	description in test report	
		7	-	deactivate network connection if activated		
		8	wait at least 15 min[a]	wait at least 15 min[a]		
		9	measure power consumption	measure power consumption	**standby mode**: P_{sm} or **off mode**: P_{om}	
	connected to network (if available)	10	-	turn on appliance if it is not already turned on		8.2.4
		11	-	activate network connection		
		optional	-	complete (any) active mode	description in test report	
		optional	-	appliance interaction[b]	description in test report	
		12	-	wait at least 15 min[a]		
		13	-	measure power consumption	Network standby: P_{ns}	
		14	turn off appliance if it is not already off	turn off appliance if it is not already off		

[a] Should an interaction occur, 15 min waiting time is needed for the appliance to revert to off mode or **standby mode** or **standby mode in condition of networked standby**.

[b] Appliance interaction may be switch on appliance, or end of active mode and associated activities, or any interaction if no other mode is triggered.

Bibliography

IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60335-2-31, *Household and similar electrical appliances – Safety – Part 2-31: Particular requirements for range hoods and other cooking fume extractors*

IEC 60704-3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values*

EN 13141-3, *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 3: Range hoods for residential use without fan*

List of comments

1 The text here slightly modifies previous text to produce credible environmentally relevant test provisions for all measurements. In the previous version the requirement to fully open extendible visors or pull-out mechanism, even if they cannot be fully opened for normal use, could have caused a better environmental performance.

2 Further information is introduced for a more repeatable measurement.

3 This new subclause should clarify that despite the given tolerance, the test setup has to be arranged meeting the nominal values of the specified targets and not to the tolerance limit intentionally.

4 Product specific requirements on low power mode measurement are introduced into this edition based on the measurement principals given in IEC 62301 and future IEC 63474.

5 Especially, the conditions to measure the low power modes need clear product specific requirements to ensure a repeatable and reproducible measurement.

6 As CFEs with network ability are more and more market relevant, clear requirements for measuring network standby are introduced.

7 Based on ISO 5801 the pressure compensation chamber is well defined now. This leads to a higher reproducibility.

8 With Table 3 a consistent, gap-free categorizing of the conducting pipe is introduced to ensure a fair comparison of all existing air outlet designs.

9 Calculation principles for Clause 10 volumetric airflow are added for better understanding.

10 In respect to representativeness, a standard specifying test methods shall consider the typical usage of a product to produce results that reflect those obtained in practice.

11 The 9-point-method was developed to reach more practical relevance: The BEP was a theoretical point the user could not approach. That is why now several speed settings are taken into account.

Another intention was to respect different practical installation conditions: The three resistance curves represent a good, a medium and a challenging practical installation condition.

12 These limits are necessary to calculate the intersection points as accurate as possible.

13 MEK was kept as a good representative for non-cyclical hydrocarbons emitted during cooking process. A recent screening on this VOC group could show that MEK is emitted during frying of beef and preparation of French fries. Meaning that MEK is not only good for handling in laboratories due to its temperature class T1 and dissolubility in water, but is appearing also in real application.

14 Lab experience showed that condensation can occur and must be detected to ensure a repeatable measurement.

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Edition 3.0 2023-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Cooking fume extractors – Methods for measuring performance

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

IEC 61591:2023-03(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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.
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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.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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*

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*

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*

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

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, *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 persist for an indefinite time:

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.

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.

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.

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 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.

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 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.

8.2.4 Determination of consumption in standby mode in condition of networked standby

This subclause is only applicable to appliances providing a **standby mode in condition of networked standby**.

For **appliances** with **network** connectivity, follow the manufacturer’s instructions regarding the configuration of the appliance and ensure that the **network** (e.g. LAN or WLAN) is connected to the appliance and activated.

The highest possible power consumption can be reached when the appliance is not only connected to the **network**, but also to a remote user interface (i.e. mobile app). Avoid any interaction with the remote user interface during the 15 min waiting time and the measurement.

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

Ensure that there is no download and no update running during the measurement.

The test report shall contain the description of the **network** connection used.

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 and test set up

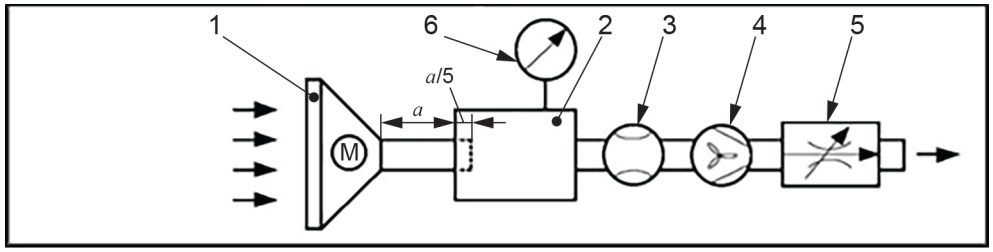
The purpose of this test is to determine the volumetric airflow.

The volumetric airflow measurement shall comply with the requirements stated in ISO 5167-1, ISO 5167-2, ISO 5167-3 and ISO 5167-4.

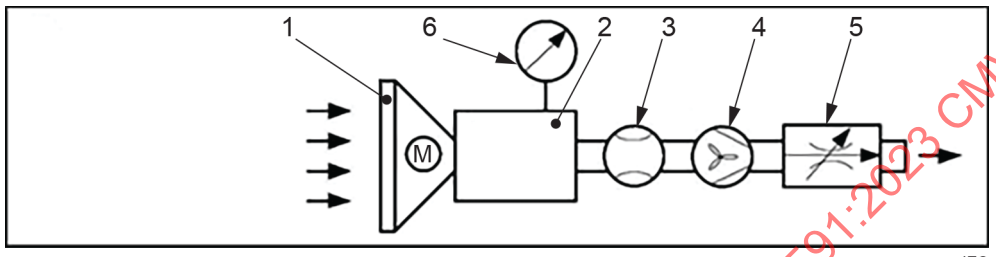
The air outlet of the **CFE** is connected to a pressure compensation chamber in accordance with Figure 1 and 6.2. For this, the inner diameter of the air outlet of the **CFE** shall be measured. The diameter of the connecting duct shall be determined in accordance with Table 3. The connecting duct shall be a rigid straight duct with smooth inner wall. A **CFE** without ducting, e.g. a **CFE** with **recirculation mode**, is connected directly to the pressure compensation chamber as shown in Figure 1b).

The pressure compensation chamber shall comply with the requirements stated in ISO 5801:2017, 9.5, with the following additional specification: the test chamber dimension D4 (see ISO 5801) shall be at least 750 mm. The distance J (see ISO 5801) can be either limited by a straightener or by the chamber wall with outlet area.

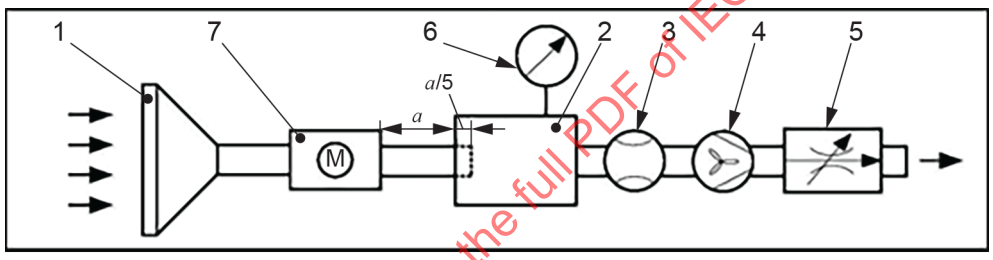
The pressure tapping point for the static pressure gauge shall have the half distance of J with a tolerance of ± 50 mm (see ISO 5801). If there is more than one pressure tapping point, all of them shall be at this distance around the chamber. Additionally, the measured values shall be averaged.



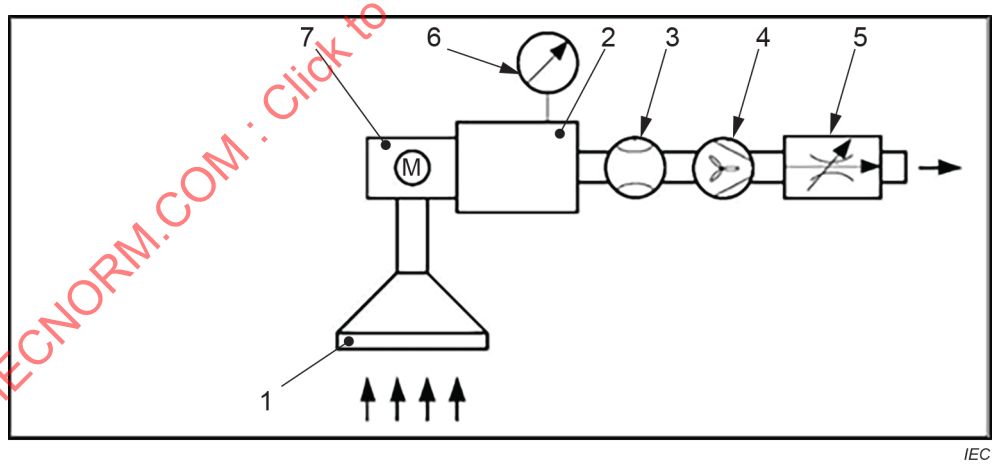
a) Setup for CFE with duct



b) Setup for CFE without duct



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



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

Key

a	5 times the inner diameter of the duct, which shall be sealed	4	auxiliary fan
1	**cooking fume extractor**	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

Follow the manufacturer's instructions regarding the distance between points 1 and 7, as shown in Figure 1c) and 1d). If there is no value for the distance given, then the distance a is used.

A **CFE** in **recirculation mode** can have air outlets with different geometries. These have to be adapted to the pressure compensation chamber.

For non-circular ducts, a virtual diameter that represents the same cross-section is considered as the inner diameter of the air outlet.

The **grease filter** is installed for the test.

The **odour-reduction filter** is not installed for the test, except if the test is done in **recirculation mode**.

10.2 Measurement of the volumetric airflow

The **CFE** is operated at the **highest continuous setting for normal use** for at least 1 800 s for warming up.

The **CFE** is operated and, by suitably adjusting the auxiliary fan or the baffle, the airflow corresponding to various pressures can be determined.

The measurements are made with the controls positioned at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

The airflow in **recirculation mode** is determined when the static pressure in the compensation chamber is at ambient pressure. For the measurement of the grease absorption in **recirculation mode** in Clause 14, the pressure drop of the **odour-reduction filter** has to be determined.

The airflow in **extraction mode** is determined for discharge into a flue, which has the following pressure drop depending on the inner diameter of the air-outlet when there is an airflow of 200 m^3/h:

Table 3 shows the parameter for the calculation of the resistance curve dependent on the measured inner diameter of the air-outlet in order to report the volumetric airflows for the used control settings.

Table 3 – Parameters for the calculation of resistance curves –

Inner diameter d of the air outlet in mm	Diameter category D	Inner diameter of the connecting pipe in mm	b_D
≤ 110	100	100 ± 2	0,000 75
110 < d ≤ 135	125	125 ± 3	0,000 375
135 < d ≤ 175	150	150 ± 5	0,000 125
175 < d ≤ 225	200	200 ± 8	0,000 062 5
> 225	250	250 ± 10	0,000 031 25

NOTE 1 The assumption for the parameter b_D is given in Annex A.

For determining the theoretical resistance curve for a flue pipe, the following formula is used:

$$\Delta p = b_D \times Q^2 \quad (1)$$

where

Δp is the numerical value of the pressure, expressed in Pa;

b_D is a value representing a diameter category;

Q is the numerical value of the airflow, expressed in m^3/h.

NOTE 2 A pressure/airflow curve is determined for the appliance.

10.3 Calculation of the volumetric airflow

Volume flow rate $Q_{s,D}$ at $WP_{s,D}$ defined at the intersection of the respective regression line and the resistance characteristics:

$$\text{Respective linear regression: } \Delta p_{C_{s,D}} = c_{s,D} \times Q_{s,D} + d_{s,D} \quad (2)$$

$$\text{Resistance characteristics: } \Delta p_{C_{s,D}} = b_D \times Q_{s,D}^2 \quad (3)$$

$$0 = -b_D \times Q_{s,D}^2 + c_{s,D} \times Q_{s,D} + d_{s,D} \quad (4)$$

where

$WP_{s,D}$ is the **working point** at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any, depending on the diameter category;

$\Delta p_{C_{s,D}}$ is the density corrected relative pressure in the chamber at reference density in Pa;

$Q_{s,D}$ is the numerical value of the airflow in m^3/h;

$c_{s,D}$ $d_{s,D}$ are polynomial coefficients to each respective polynomial;

b_D is the defined variable representing the diameter category, see Table 3.

The volumetric airflow is reported for the working points at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

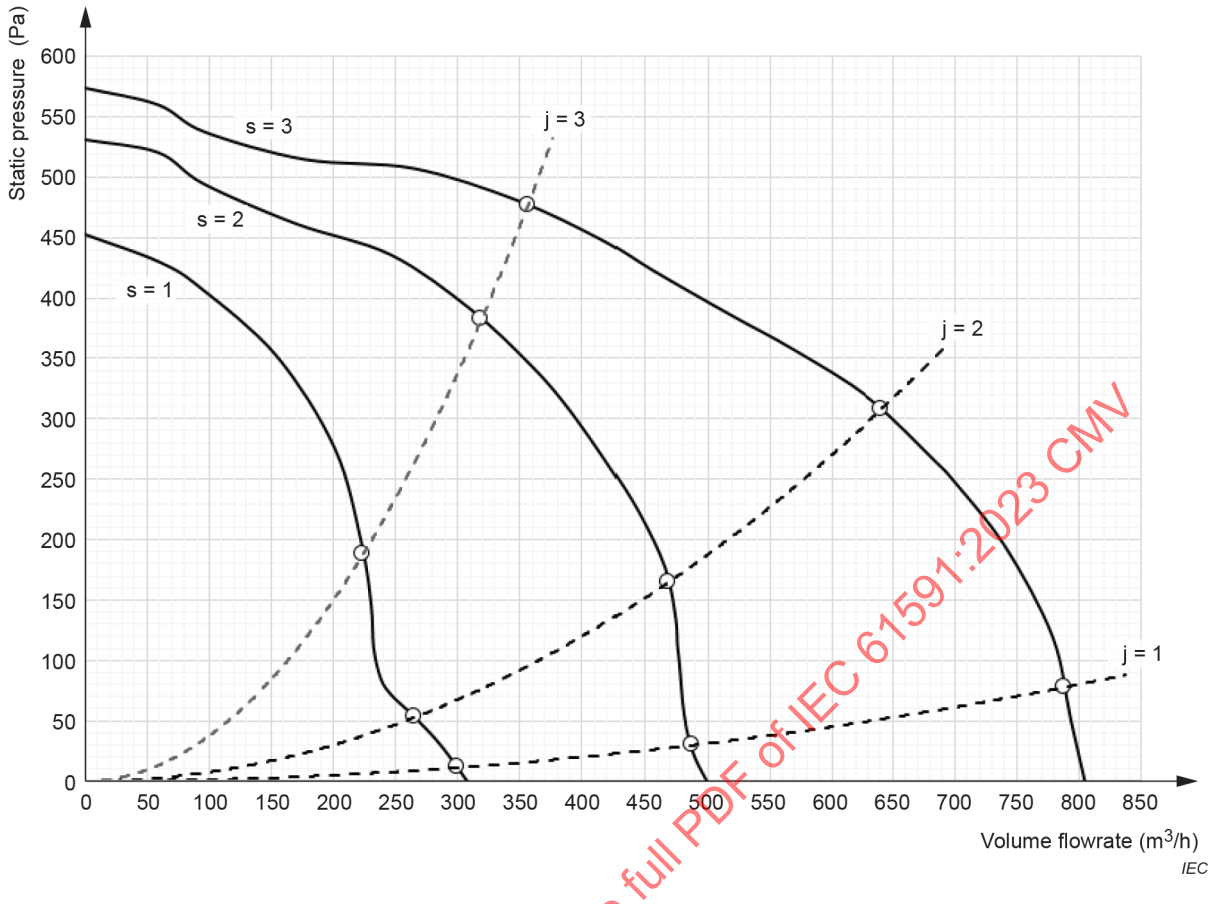
11 Fluid dynamic efficiency

11.1 Purpose

The purpose of this test is to determine the fluid dynamic efficiency taking into account **highest continuous setting for normal use**, the **lowest setting**, the **boost position setting,** if any, and different pressure drops representative for different ducting.

11.2 Determining the working points

The measurement setup described in 10.1 shall be used.



Key

s=1 pressure/airflow curve of a **CFE** at **lowest setting**

s=2 pressure/airflow curve of a **CFE** at **highest continuous setting for normal use**

s=3 pressure/airflow curve of a **CFE** at **boost position setting**

j=1 resistance curve of a ducting system with low losses

j=2 resistance curve of a commonly used ducting system

j=3 resistance curve of a ducting system with high losses

○ working point (intersection of the duct pressure drop and the characteristic curve of the **CFE**)

Figure 2 – 9 working points of a cooking fume extractor in extraction mode (example)

The resistance curves in Figure 2 are determined, independent of the inner air outlet diameter of the **CFE** under test as follows:

$$j = 1$$

– j = 1 represents a resistance curve of a ducting system with low losses.

– The resistance curve is calculated with Equation (1), where b = 0,000 375 (corresponds to a theoretical resistance curve for a flue pipe with 15 Pa at 200 m^3/h).

$$j = 2$$

– j = 2 represents a resistance curve of a commonly used ducting system.

– The resistance curve is calculated with Equation (1), where b = 0,000 75 (corresponds to a theoretical resistance curve for a flue pipe with 30 Pa at 200 m^3/h)

$$j = 3$$

– j = 3 represents a resistance curve of a ducting system with high losses.

– The resistance curve is calculated with Equation (1), where b = 0,003 75 (corresponds to a theoretical resistance curve for a flue pipe with 150 Pa at 200 m^3/h).

The airflow is measured at the **highest continuous setting for normal use**, at the **lowest setting**, and at the **boost position setting**, if any.

For warming up, the **CFE** is operated at the setting which is under test until steady operation is ensured.

Measuring points per pressure/airflow curve shall be measured at steady operation, where the interval in between two points shall be ≤ 25 m^3/h and ≤ 25 Pa.

These requirements on the measuring points shall be fulfilled only for the measuring points selected for calculation (see 10.3).

For each measuring point, the electric power consumption shall be reported. Additionally, the order of measurements applied shall be reported.

11.3 Calculation of the fluid dynamic efficiency (FDE)

11.3.1 Conversion to reference air density

11.3.1.1 Relative static pressure

The static pressure shall be converted to a reference density of 1,2 kg/m^3 according to Formula (5):

$$\Delta p_{C_{s,j}} = \Delta p_{Cha} \frac{\rho_{Ref}}{\rho_{Cha}} \tag{5}$$

where:

Δp_{Cha} is the relative pressure in the chamber at test conditions, in Pa;

$\Delta p_{C_{s,j}}$ is the density corrected relative pressure in the chamber at reference density, in Pa;

ρ_{Ref} is the reference air density of 1,2 kg/m^3;

ρ_{Cha} is the air density in the chamber at test conditions, in kg/m^3.

11.3.1.2 Electric power consumption

The electrical power consumption shall be converted to reference density of 1,2 kg/m^3 according to Formula (6):

$$P_C = P_{Cha} \frac{\rho_{Ref}}{\rho_{Cha}} \tag{6}$$

where:

P_{Cha} is the electric power consumption in the chamber at test conditions, in W;

P_C is the density corrected electric power consumption at reference density, in W;

ρ_{Ref} is the numerical value of the reference air density of 1,2 kg/m^3;

ρ_{Cha} is the air density in the chamber at test conditions, in kg/m^3.

11.3.2 Calculating the corrected working points $WP_{C_{s,j}}$

The volumetric airflow, the static pressure and the electric power consumption at the working points of the three pressure/airflow curves s = 1, 2, 3 and the three resistance curves j = 1, 2, 3 of the **CFE** shall be calculated.

If the **CFE** is not fitted with a **boost position setting**, then the working points $WP_{C_{s,j}}$ of s = 2 are equal for s =3.

The working points shall be calculated by the measured points per pressure/airflow curve (see 10.3) and the corresponding electric power consumption. The calculation shall be done for each of the 9 working points; see Figure 2.

a) Selecting the measured points

Two measured points shall be selected for each working point, with one of these points lying above and one of these points lying below the working point to be determined, i.e. the differential pressure Δp of the respective working point.

b) Calculating the regression lines

With the two selected measured points the respective regression lines shall be calculated by a linear regression for the pressure/airflow curve and for the electric power consumption.

c) Calculating the working point $WP_{s,j}$

$WP_{s,j}$ is defined as the intersection of the respective regression line and its resistance characteristics, i.e. it is defined by $Q_{s,j}$, $\Delta p_{C_{s,j}}$ and $P_{C_{s,j}}$.

Respective linear regression:
$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (7)$$

Resistance characteristics:
$$\Delta p_{C_{s,j}} = b_j \times Q_{s,j}^2 \quad (8)$$

$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} = b_j \times Q_{s,j}^2 \quad (9)$$

where

$Q_{s,j}$ is the numerical value of the airflow, in m^3/h;

$c_{s,j}$, $d_{s,j}$ are polynomial coefficients to each respective polynomial;

b_j is the defined variable representing three discrete diameter categories (see 10.3).

d) Volume flow rate $Q_{s,j}$ at $WP_{s,j}$

$$0{,}001 \geq -b_j \times Q_{s,j}^2 + c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (10)$$

e) Density corrected difference static pressure at $WP_{s,j}$

$$\Delta p_{C_{s,j}} = c_{s,j} \times Q_{s,j}^1 + d_{s,j} \quad (11)$$

f) Density corrected electric power consumption at $WP_{s,j}$

$$P_{C_{s,j}} = e_{s,j} \times Q^{1}_{s,j} + f_{s,j} \quad (12)$$

where

$P_{C_{s,j}}$ is the density corrected electric power consumption at $WP_{s,j}$

$e_{s,j}, f_{s,j}$ are polynomial coefficients of each respective linear function.

11.3.3 Calculating the fluid dynamic efficiency (FDE)

The calculation of the fluid dynamic efficiency (FDE) is only possible for a **CFE** in **extraction mode**.

The FDE for each pressure/airflow curve s =1, 2, 3 is calculated according to Formula (13):

$$FDE_s = \frac{1}{3} \sum_{j=1}^{3} \frac{\Delta p_{C_{s,j}}}{3600} \times \frac{Q_{s,j}}{P_{C_{s,j}}} \quad (13)$$

where

FDE_s is the fluid dynamic efficiency for the corrected pressure/airflow curve s;

$\Delta p_{C_{s,j}}$ is the density corrected relative pressure in the chamber at reference density;

$Q_{s,j}$ is the numerical value of the airflow, in m^3/h;

$P_{C_{s,j}}$ is the density corrected electric power consumption at $WP_{s,j}$.

The fluid dynamic efficiency FDE is calculated by summing the FDE_s, in accordance with Formula (14):

$$FDE_{CFE} = \sum_{s=1}^{3} \frac{t_s}{t_1 + t_2 + t_3} \times FDE_s \quad (14)$$

where

FDE_{CFE} is the fluid dynamic efficiency of CFE corrected to reference air density, rounded to first decimal place;

t_1 is the running time for s = 1, t_1 = 20 min;

t_2 is the running time for s = 2, t_2 = 30 min;

t_3 is the running time for s = 3, t_3 = 10 min;

t_s is the partial time per stage in min.

NOTE The running time is related to average household use.

12 Effectiveness of the lighting system

12.1 Purpose

This method is used to assess the effectiveness of the **lighting system** of **CFE**.

12.2 Measurement

The **lighting system** of the **cooking fume extractor** is operated for at least 1 800 s for warming up.

The test is carried out in a room in which all other light sources are extinguished. During the test, only the **lighting system** of the **CFE** is on.

The electric power input of the **lighting system** (P_L) is determined by measuring the electric power input of the whole **CFE** while only the **lighting system** is turned on. P_L is stated in W and rounded to the first decimal place.

NOTE P_L includes losses at the transformer or other electronic components.

To avoid reflections, all adjacent surfaces, including the backwall and the cooking appliance, are covered, extended by at least 500 mm on both the left-hand and right-hand sides of the measurement area with a sheet of matt-black painted plywood or similar board.

The distance as determined in 6.2 is the distance between the **cooking fume extractor** mounted and the aperture of the illuminance measurement device.

The number and positioning of the measurement points is defined in Table 4 according to the width W of the **cooking fume extractor**. The maximum width in accordance with 7.1 applies. The positions of the measurement points are determined in Figure 3, whereby the measurement points 1, 2 and 3 show the centreline of the **cooking fume extractor**.

Table 4 – Relevant measurement points for assessing the effectiveness of the lighting system

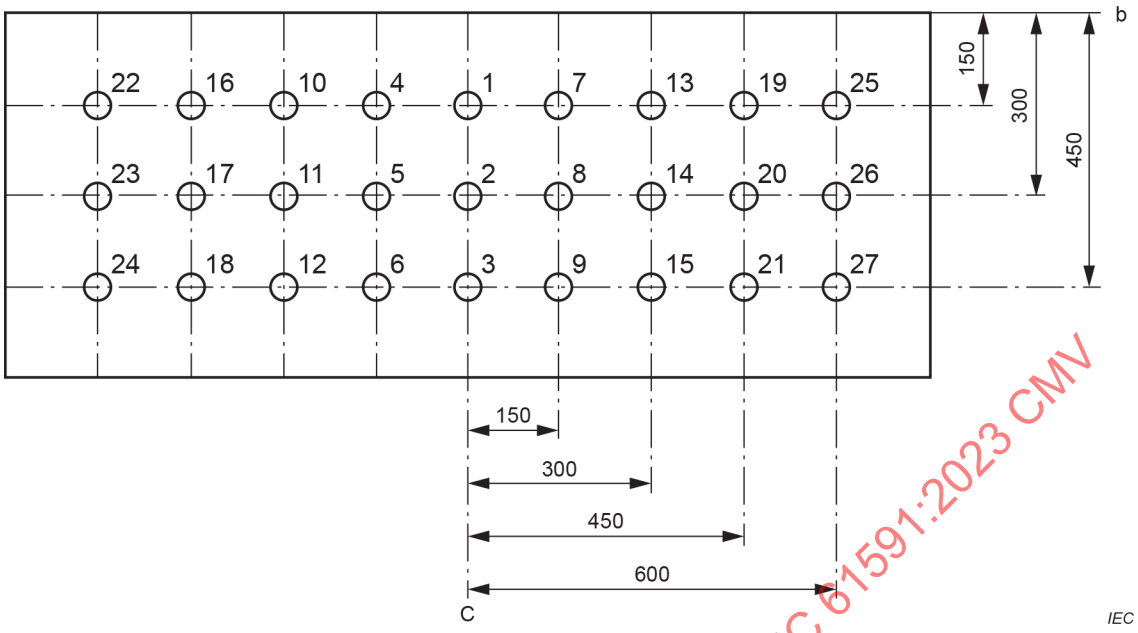
Width (W) of cooking fume extractor (see 7.1) mm	Relevant measurement points (see Figure 3)
W < 800	1 to 9
800 ≤ W < 1 050	1 to 15
1 050 ≤ W < 1 300	1 to 21
W ≥ 1 300	1 to 27

The centre of **island range hoods** and **ceiling range hoods** shall be in line with measurement point 2 (see Figure 3).

Wall range hoods, **built-in range hoods** and **microwave hood combinations** are mounted on the wall of the test room. The baseline of the measurement panel in Figure 4 is aligned to the wall of the test room.

The illuminance for each measurement point is stated in lux and rounded to the nearest integer.

Dimensions in millimetres



Key

C centre line defined by the measurement points 1, 2 and 3

b baseline

◯ measurement points

Figure 3 – Measurement points for assessing the effectiveness of the lighting system

12.3 Assessment

The arithmetic average of the measurement points under test is calculated, and this value is stated as the **illumination** E_{middle} in lux, rounded to the nearest integer.

13 Odour reduction

13.1 Purpose

This method is used to assess the effectiveness of **odour-reduction filter**(s) of **CFE**s operated in **recirculation mode**.

NOTE The method is not used for **cooking fume extractors** operated in **extraction mode,** because odour-reduction filters are not used in **extraction mode**.

13.2 Measuring setup

The test is carried out in a sealed room having a volume of (22 ± 2) m^3, the walls of which are impervious to methyl ethyl ketone (MEK). The response time of the system is measured by placing an easily detectable amount of MEK directly at the entrance of a sampling point and measuring the time until it is detected. The response time is added to all measurements where the information arrives delayed by this time.

An electric hob is installed along one of the longer walls of the room together with kitchen cabinets. The kitchen cabinets and wall cabinets shall be sealed from the rest of the air in the test room. The room is considered to be adequately sealed if the concentration of MEK in the room drops by less than 5 % 60 min after the solution has been distributed.

CFEs, except **down-draft systems**, are installed centrally above the electric hob, at a height of (600 ± 10) mm. On both sides, wall cabinets are mounted.

Island range hoods and **ceiling range hoods** are installed also at a height of (600 ± 10) mm above the electric hob, but not centrally. They are installed with a distance to the wall of (200 ± 5) mm. No wall cabinets are mounted on either side.

Down-draft systems shall be installed in accordance with the manufacturer's instructions. Wall cabinets are not mounted.

The room and the kitchen furniture, together with the layout, are shown in Figure 4.

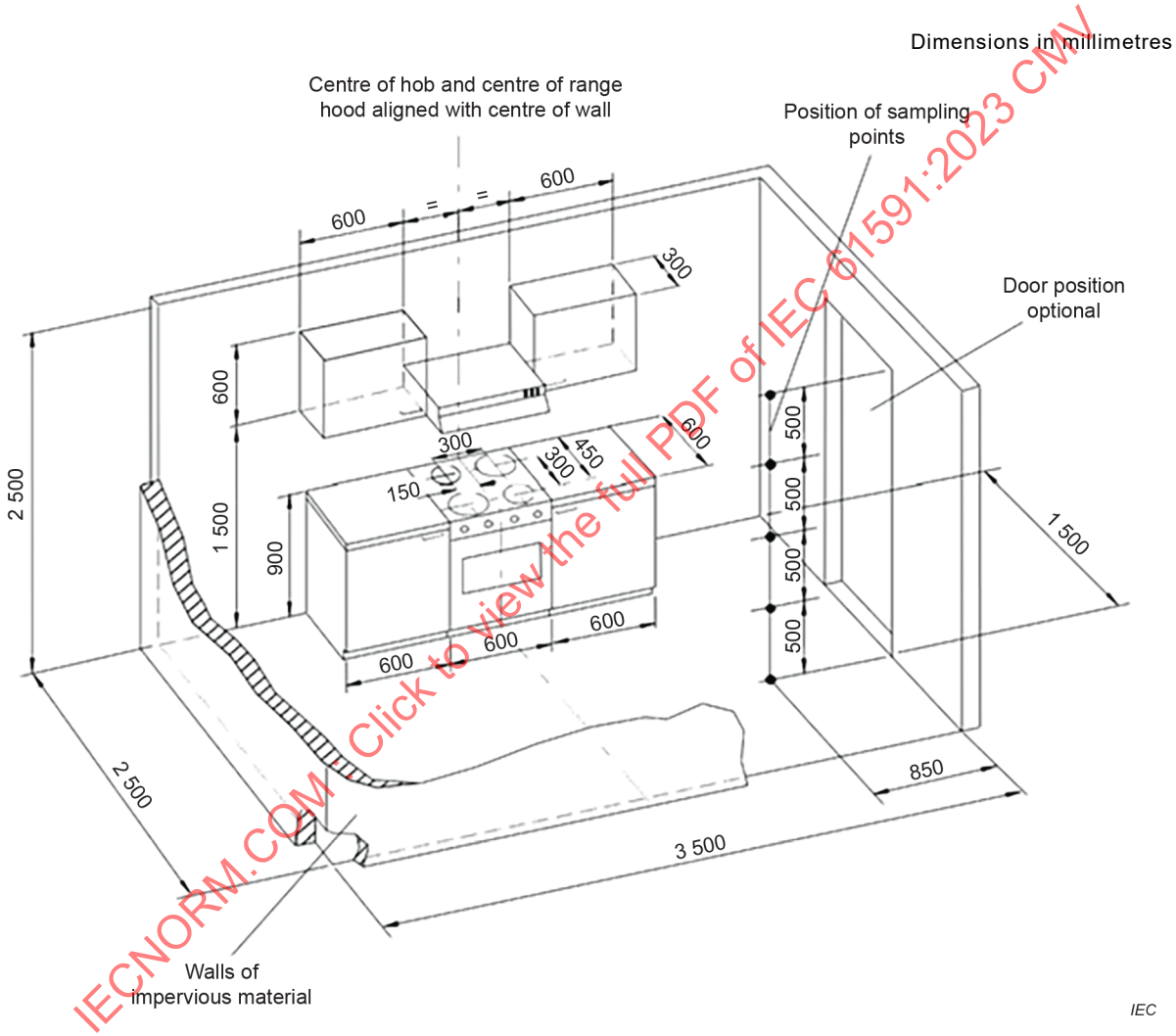


Figure 4 – Example of a test room

When handling MEK, normal precautions have to be taken.

The characteristics of the test room are established without the **cooking fume extractor** being operated. The same cookware as specified in Clause 14 is placed on the front left-hand cooking zone, matching the size of the cooking zone as well as possible. For the placing of cookware on a **down-draft system**, see Figure 6. However, it may vary by a maximum of ±20 mm. If an electric hob element is used, the height of the hob element and the cookware shall not exceed 205 mm.

Following the description in Clause 14, a thermocouple is mounted on the cookware.

The temperature in the bottom of the cookware shall be maintained at (170 ± 10) °C.

A solution containing (12 ± 0,1) g of methyl ethyl ketone (MEK) in (300 ± 1) g of demineralised water is continually dripped onto the cookware at such a rate that all the solution has been used after (1 800 ± 10) s plus response time. The solution is evenly dispersed throughout the room by means of a fan. The concentration of MEK in the room C_1 is measured (1800 ± 10) s after the dripping started. For this, the concentration of MEK is detected using four sampling points each separated by (500 ± 10) mm vertically, as shown in Figure 5. The detection equipment for measuring the MEK concentration is located outside the room. PTFE tubes with an inner diameter of (2,0 ± 0,2) mm of equal length and connected to each other are suitable to link the sampling points to the measuring equipment.

Between the sampling point and the detection equipment for measuring the MEK, in case of condensation, the tubes should be heated and controlled to avoid condensation.

NOTE Flame ionization equipment is suitable for measuring the concentration of MEK.

The room is ventilated until the concentration of MEK is less than 1 % of C_1.

The **CFE** is operated at the **highest continuous setting** for normal use for at least 1 800 s for warming up.

The **odour-reduction filter(s)** are conditioned by heating at (50 ± 5) °C for at least 16 h. Then they are mounted into the warmed up **CFE**.

13.3 Measurement

The **CFE** is operated with any fan control adjusted to the **highest continuous setting for normal use** immediately after warming up. The MEK solution is dripped into the heated cookware so that (312 ± 1,5) g has been evaporated within (1 800 ± 10) s. The concentration of MEK C_2 in the room is measured (1 800 ± 10) s plus response time after the dripping started.

The **CFE** is operating while the time for the concentration of MEK to fall from C_2 to 15 % of C_1 is taken. This time is stated as **odour dispersion time** in min. If the concentration of 15 % of C_1 is not reached after 60 min of dispersion time, the measurement is stopped.

C_1 and C_2 are rounded to the nearest integer and noted in parts per million.

13.4 Calculation of the odour reduction factor

The **odour reduction factor** O_f is calculated in per cent as follows:

$$O_f = \frac{C_1 - C_2}{C_1} \times 100\% \quad (15)$$

where

C_1 is the concentration of MEK at the end of the test without operating the **cooking fume extractor**;

C_2 is the concentration of MEK at the end of the test while operating the **cooking fume extractor**.

The **odour reduction factor** rounded to the first decimal and the **odour dispersion time** are stated.

14 Grease absorption

14.1 Purpose

This test is used to measure the efficiency of the **grease filter**.

The **grease filter** includes all detachable coverings, filter frames, plates or supports, which are intended to be removed for cleaning without tools.

14.2 Measuring setup

All tests are carried out with identical new or cleaned filters and with a new or cleaned **CFE** and clean cookware.

A chamber in accordance with Figure 5 and Figure 6 is used fitted with an absolute filter having a collecting efficiency of at least 99,995 %. The frame of the absolute filter shall not pick up any humidity. Its sides are sealed to the walls of the chamber. The equipment under test shall achieve the airflow at **highest continuous setting for normal use** in accordance with 10.3.

The air outlet from the chamber is connected to an auxiliary fan for controlling the pressure. The arrangement is shown in Figure 5 and Figure 6.

For a **range hood** or a **microwave hood combination**, a suitable electric hob element is positioned in accordance with 6.2. For a **down-draft system**, a suitable electric hob element is placed in accordance with Figure 6.

On this hob element, a piece of cookware (see Figure 7) with the following specifications is centrally positioned:

– outer bottom diameter (200 ± 20) mm;
– height (125 ± 20) mm;
– uncoated;
– thickness of bottom (7 ± 1) mm;
– flatness of the bottom inside the cookware at ambient room temperature ≤ 0,2 mm (convex);
– material: stainless steel.

The diameter of the electric hob element shall match the diameter of the cookware as well as possible. However, it may vary by a maximum of ±20 mm. The height of the electric hob element and the cookware shall not be higher than 205 mm.

In the bottom of the cookware, a thermocouple or temperature sensor in accordance with 6.6 is mounted as shown in Figure 7. The thermocouple or temperature sensor shall be in contact with the bottom of the cookware.

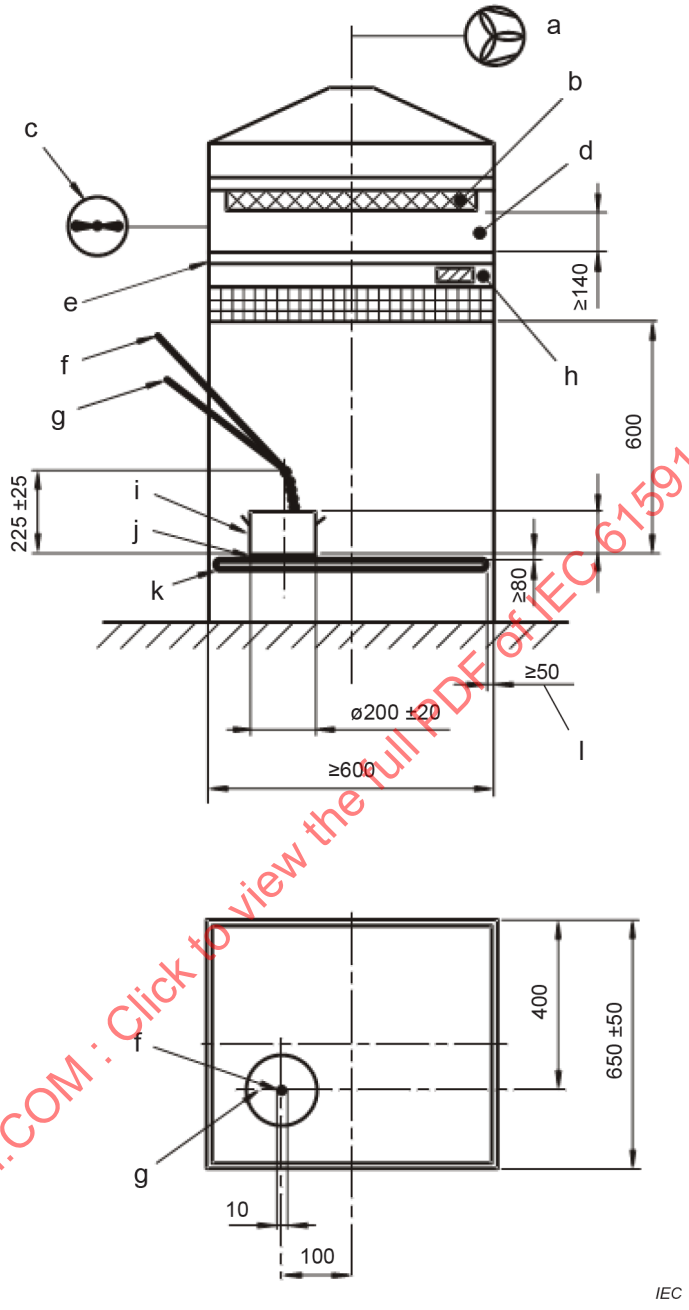
The electric hob element is operated in such a way that the temperature in the bottom of the cookware is maintained at a temperature of (250 ± 5) °C.

During the measurement, oil and water are dripped on the hot cookware. The points from which the oil and water are dripped are (10 ± 0,5) mm apart. The position of the cookware and means for supplying the oil and water is also shown in Figure 5 and Figure 6.

Refined and fresh corn oil shall be used with a temperature of (23 ± 2) °C. Demineralised water shall be used with a temperature of (23 ± 2) °C.

NOTE A possible supplier for corn oil is Mazola Keimöl[1].

Dimensions in millimetres



1 Mazola Keimöl is the trade name of a product supplied by Peter Kölln GmbH&Co. KGaA. Mazola Keimöl might be commercially available by other suppliers after the date of publication of this document. This information is given for the convenience of the users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products can be used if they can be shown to lead to the same results.

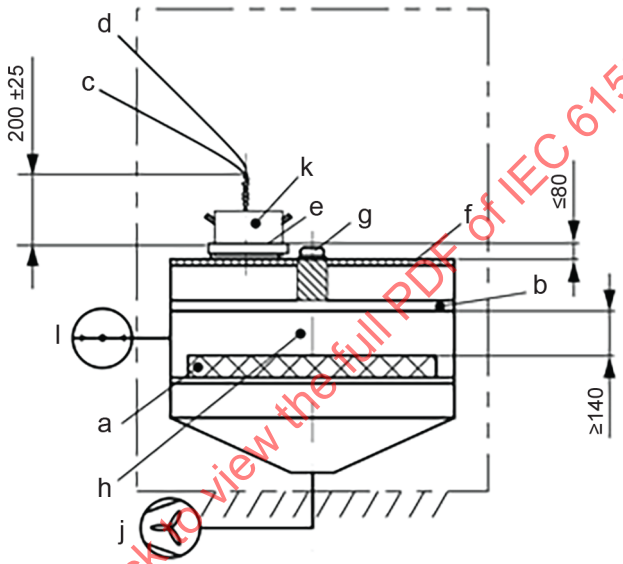
Key

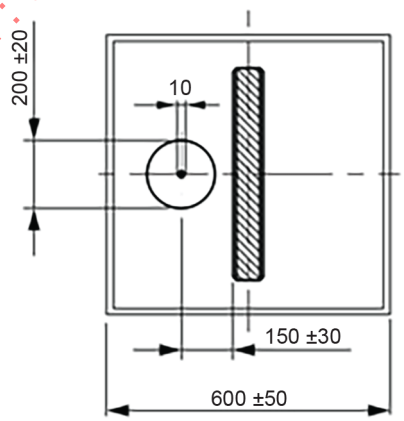
a	variable auxiliary fan	g	dosing pump for adding drops of corn oil
b	absolute filter with removable filter insert	h	**range hood**
c	pressure gauge	i	cookware
d	compensation chamber	j	electric hob
e	intermediate shelf with openings according to the outlet of the hood	k	vertically adjustable table
f	dosing pump for adding drops of distilled water	l	minimum 50 mm gap around vertically adjustable table

Distance between the **cooking fume extractor** and the adjustable table in accordance with 6.2.

Figure 5 – Chamber for the grease absorption of a range hood or a microwave hood combination

Dimensions in millimetres





IEC

a	absolute filter with removable filter insert	g	down-draft system
b	intermediate shelf with opening according to the outlet of the equipment under test	h	compensation chamber
c	dosing pump for adding drops of demineralised water	j	external blower
d	dosing pump for adding drops of corn oil	k	cookware
e	suitable electric hob element	l	pressure gauge
f	desk		

Figure 6 – Chamber for the grease absorption of a down-draft system

Dimensions in millimetres

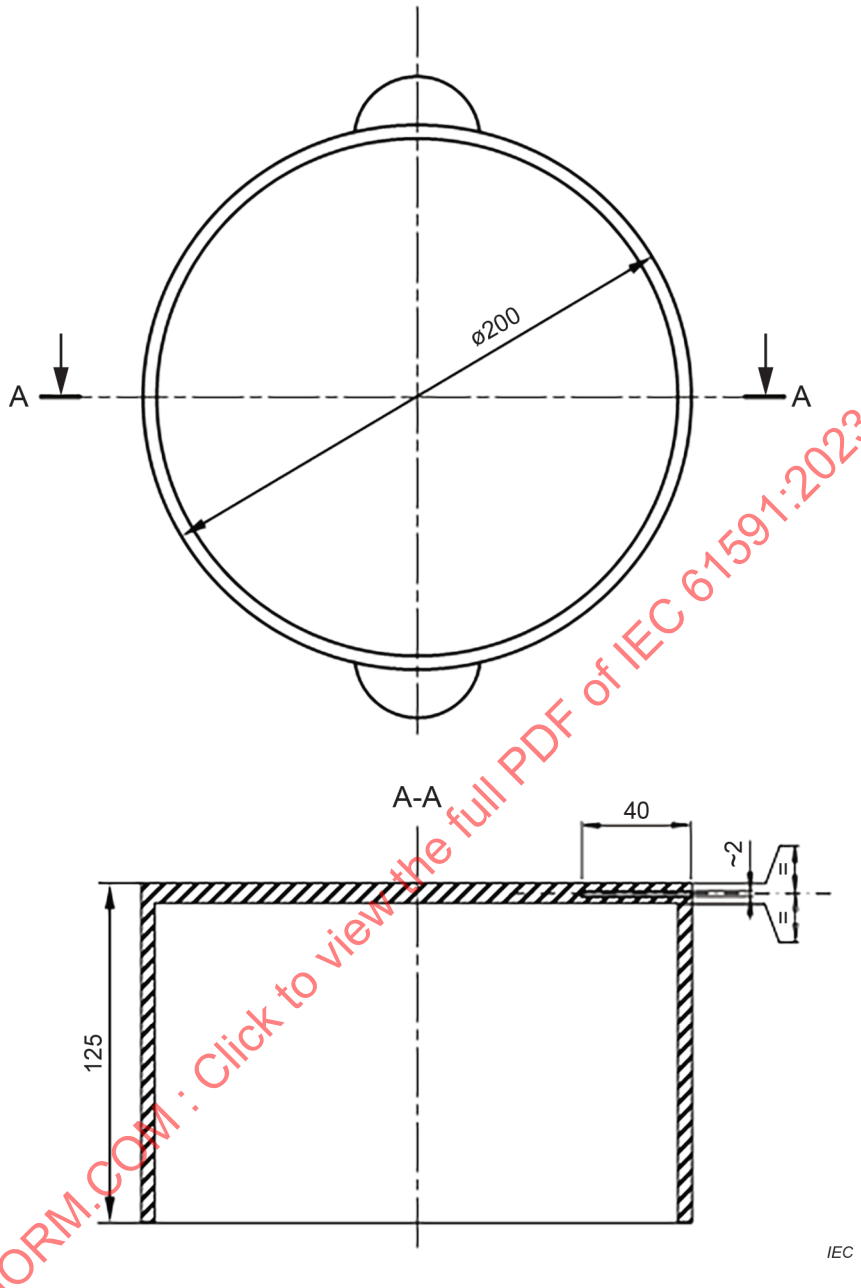


Figure 7 – Cookware used for measuring the grease absorption

14.3 Preparation

14.3.1 Determining the mass

The test is to be performed without the **odour-reduction filter**(s).

The mass of the **CFE** is measured without the **grease filter**(s) and without the **odour-reduction filter**(s).

To dry the **grease filter(s)**, they are placed in a pre-heated cabinet for at least 60 min at a temperature of (50 ± 5) °C continuously. The mass of the **grease filter**(s) is determined separately, immediately after drying.

The absolute filter (see Figure 5 and Figure 6) is placed in a pre-heated cabinet for at least 60 min at a temperature of (50 ± 5) °C continuously. The mass is determined immediately after drying. In the event of a doubt, the absolute filter is dried for a further 3 h during which time the mass should not reduce by more than 0,5 g.

The mass of the **CFE**, the **grease filter**(s) and the absolute filter is rounded to ±0,1 g and stated.

14.3.2 Warm-up period

The **CFE** with the mounted and weighed filter(s) is installed in the chamber fitted with the mounted and weighed absolute filter in accordance with Figure 5 and Figure 6, the arrangement being such that the air in the chamber has to pass through the **CFE**.

In the case of a **multiple combination hood** and a **down-draft system** with a separately mounted fan, the fan does not need to be mounted during the grease absorption test. The desired airflow rate can instead be achieved by using the auxiliary fan and by controlling the airflow with a suitable device.

The **CFE** is operated at the **highest continuous setting for normal use** for at least 1 800 s.

14.3.3 Determining the working point *WP*

The working point *WP* determined in Clause 10 for the **highest continuous setting for normal use**, related to the measured inner air outlet, shall be applied.

14.4 Measurement

Before starting the measurement, the cookware is preheated to the required temperature of (250 ± 5) °C.

If this temperature is reached, the **CFE** is operated with any fan control adjusted to the **highest continuous setting for normal use**.

At the same time, (48 ± 1) ml of corn oil per 1 800 s and (69 ± 1) ml of demineralised water per 1 800 s are dripped onto the heated cookware continuously. The nozzle diameter is (2,8 ± 0,1) mm.

In **extraction mode**, the auxiliary fan is adjusted and controlled to the **working point** *WP*. For this, the variable auxiliary fan is turned on and set to the pressure in Pa measured in accordance with Clause 10.

In **recirculation mode**, the auxiliary fan is adjusted and controlled to the pressure drop determined in Clause 10 with the **odour-reduction filter**(s) mounted.

The test is carried out for 1 800 s ± 10 s, after which the supply of oil and water is stopped and the electric hob is switched off. The **cooking fume extractor** and the auxiliary fan are switched off (600 ± 10) s later.

14.5 Assessment

The **CFE** is weighed again after removal of the **grease filter** and the mass of oil retained is determined. Oil that drips from the appliance during the measurement procedure is not taken into account. Oil that drips from the appliance after the measurement procedure is added to w_r.
The **grease filter** and absolute filter are placed in a drying cabinet again for at least 60 min at a temperature of (50 ± 5) °C continuously. Afterwards, they are weighed immediately and the mass of the oil they contain is determined.

Oil that drips from the filters during the drying process is added to w_g.

For **down-draft systems** integrated in a cooking appliance, the oil that is on the surface of the cooking appliance is not added to w_r.

The masses are measured to ±0,1 g.

The **grease absorption factor** G_{FE} is calculated in percent as follows:

$$G_{FE} = \frac{w_g}{w_r + w_t + w_g} \times 100\% \quad (16)$$

where

w_g is the mass of oil, in g, in the **grease filter**, including all detachable parts;

w_r is the mass of oil, in g, retained in the airways of the **CFE** and oil retained in ducting used in the chamber(s) to connect the **CFE** to the compensation chamber (see Figure 5 and Figure 6);

w_t is the mass of oil, in g, retained in the absolute filter.

The **grease absorption factor** G_{FE} is rounded to the first decimal place.

The test is carried out twice, and the average **grease absorption factor** is stated.

Annex A
(informative)

Assumption for the parameter b (see Table 3)

This Annex explains the assumptions made to calculate the parameter b.

Figure A.1 shows a ducting system with low losses.

Dimensions in metres

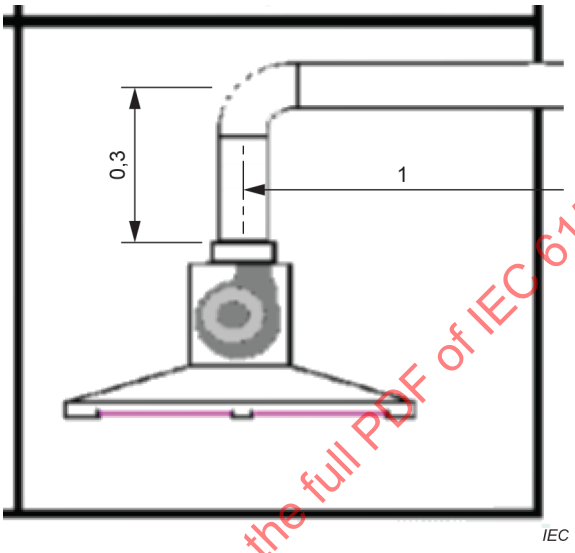


Figure A.1 – Typical ducting

The resistance curve in this document is based on a ducting with a 0,3 m pipe, a 90° elbow and a 1 m pipe.

Annex B
(normative)

Low power mode measurements

Table B.1 – Step by step instruction for measuring low power modes

Mode/ condition		Type of appliance: step	Appliance without network standby	Appliance with network standby	Measured parameter	Reference
standby and off mode	not connected to network (deactivate network connection if activated)	1	connect appliance to power supply	connect appliance to power supply		8.2.2 8.2.3
		2	wait at least 15 min	wait at least 15 min		
		3	appliance is in **off mode** or **standby mode**	appliance is in **off mode** or **standby mode**		
		4	measure power consumption	measure power consumption	standby mode: P_{sm} or **off mode**: P_{om}	
		5	turn on appliance	turn on appliance		8.2.2 8.2.3
		optional	complete (any) active mode	complete (any) active mode	description in test report	
		6	appliance interaction[b]	appliance interaction[b]	description in test report	
		7	-	deactivate network connection if activated		
		8	wait at least 15 min[a]	wait at least 15 min[a]		
		9	measure power consumption	measure power consumption	**standby mode**: P_{sm} or **off mode**: P_{om}	
	connected to network (if available)	10	-	turn on appliance if it is not already turned on		8.2.4
		11	-	activate network connection		
		optional	-	complete (any) active mode	description in test report	
		optional	-	appliance interaction[b]	description in test report	
		12	-	wait at least 15 min[a]		
		13	-	measure power consumption	Network standby: P_{ns}	
		14	turn off appliance if it is not already off	turn off appliance if it is not already off		

[a] Should an interaction occur, 15 min waiting time is needed for the appliance to revert to off mode or **standby mode** or **standby mode in condition of networked standby**.

[b] Appliance interaction may be switch on appliance, or end of active mode and associated activities, or any interaction if no other mode is triggered.

Bibliography

IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60335-2-31, *Household and similar electrical appliances – Safety – Part 2-31: Particular requirements for range hoods and other cooking fume extractors*

IEC 60704-3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values*

EN 13141-3, *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 3: Range hoods for residential use without fan*

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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EXTRACTEURS DE FUMÉE DE CUISINE – MÉTHODES DE MESURE DE L'APTITUDE À LA FONCTION

AVANT-PROPOS

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L'IEC 61591 a été établie par le sous-comité 59K: Aptitude à la fonction des appareils électrodomestiques et similaires de cuisson électrique, du comité d'études 59 de l'IEC: Aptitude à la fonction des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette troisième édition annule et remplace la deuxième édition parue en 2019. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) redéfinition du terme "point de fonctionnement" (voir 3.20);
b) redéfinition des termes "**réglage le plus bas**" et "réglage automatique" (voir 3.23 et 3.24);
c) révision des exigences concernant l'installation et le positionnement (voir 6.2);

d) ajout de la référence normative ISO 5801 pour la spécification de la chambre de compensation de pression (voir Article 10);

e) création d'articles distincts concernant la détermination du débit d'air volumétrique et du rendement dynamique des fluides (voir Articles 10 et 11);

f) nouvelle approche concernant la détermination du rendement dynamique des fluides ("calcul en 9 points");

g) nouvelles définitions, nouvel article et nouvelle Annexe B concernant la mesure des modes faible puissance;

h) nouvelle Annexe A: hypothèse formulée pour le paramètre b.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
59K/352/CDV	59K/361/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Dans la présente norme, les caractères d'imprimerie suivants sont utilisés:

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EXTRACTEURS DE FUMÉE DE CUISINE – MÉTHODES DE MESURE DE L'APTITUDE À LA FONCTION

1 Domaine d'application

Le présent document s'applique aux **extracteurs de fumée de cuisine** comportant un ventilateur pour le **mode recyclage** ou **extraction**, installés dans une cuisine à usage domestique.

Il peut également être utilisé pour les **extracteurs de fumée de cuisine** lorsque le ventilateur est monté séparément de l'appareil, mais est commandé par celui-ci lorsqu'il est mentionné dans la documentation technique (données inscrites sur la plaque signalétique, par exemple) et dans les instructions d'installation.

Le présent document couvre également les **extracteurs verticaux** installés à côté, à l'arrière ou au-dessous de l'appareil de cuisson.

Le présent document définit les caractéristiques de performance principales de ces appareils qui sont pertinentes pour l'utilisateur et spécifie les méthodes de mesure de ces caractéristiques.

Le présent document ne spécifie pas un système de classement pour l'aptitude à la fonction de ces appareils.

NOTE 1 Le présent document ne traite pas des exigences de sécurité qui sont conformes aux normes IEC 60335-1 et IEC 60335-2-31.

NOTE 2 Les **extracteurs de fumée de cuisine** sans ventilateur actionnés par un système de ventilation centralisé sont couverts par l'EN 13141-3.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60584-1, *Couples thermoélectriques – Partie 1: Spécifications et tolérances en matière de FEM*

IEC 60704-2-13, *Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien – Partie 2-13: Exigences particulières pour les hottes de cuisine et autres extracteurs de fumées de cuisine*

IEC 60751, *Thermomètres à résistance de platine industriels et capteurs thermométriques en platine*

IEC 62301:2011, *Appareils électrodomestiques – Mesure de la consommation en veille*

IEC 63474:—[1], *Appareils électriques et électroniques pour application domestique et équipement de bureau – Mesure de la consommation d'énergie en veille avec maintien de la connexion au réseau des équipements de périphérie*

ISO 5167-1, *Mesurage de débit des fluides au moyen d'appareils déprimogènes insérés dans des conduites en charge de section circulaire – Partie 1: Principes généraux et exigences générales*

ISO 5167-2, *Mesurage de débit des fluides au moyen d'appareils déprimogènes insérés dans des conduites en charge de section circulaire – Partie 2: Diaphragmes*

ISO 5167-3, *Mesurage de débit des fluides au moyen d'appareils déprimogènes insérés dans des conduites en charge de section circulaire – Partie 3: Tuyères et Venturi-tuyères*

ISO 5167-4, *Mesurage de débit des fluides au moyen d'appareils déprimogènes insérés dans des conduites en charge de section circulaire – Partie 4: Tubes de Venturi*

ISO 5801:2017, *Ventilateurs – Essais aérauliques sur circuits normalisés*

ISO 80000-1:2009, *Grandeurs et unités – Partie 1: Généralités*

3 Termes et définitions

Pour les besoins du présent document, les termes et définitions suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse https://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse https://www.iso.org/obp

3.1
mode actif
mode dans lequel l'appareil est connecté au secteur, a été mis en marche et réalise l'une des fonctions prévues

EXEMPLES de fonctions prévues: fonctionnement du ventilateur ou du système d'éclairage.

Note 1 à l'article: L'affichage d'informations, le téléchargement de logiciels, le mode automatique commandé par capteur et la communication avec le foyer de cuisson constituent des activités associées.

3.2
extracteur de fumée de cuisine
CFE
appareil équipé d'un ventilateur et d'un filtre destinés à recueillir et traiter les fumées de cuisson, qui peut fonctionner en **mode recyclage** ou en **mode extraction**

Note 1 à l'article: L'abréviation "CFE" est dérivée du terme anglais développé correspondant "cooking fume extractor".

3.3
hotte de cuisine
extracteur de fumée de cuisine installé au-dessus d'un appareil de cuisson

[1] En cours d'élaboration. Stade au moment de la publication: IEC CDV 63474:2022.

3.3.1
hotte murale
hotte de cuisine fixée au mur

3.3.2
hotte en îlot
hotte de cuisine fixée au plafond

3.3.3
hotte de plafond
hotte de cuisine intégrée sur ou dans le plafond

3.3.4
hotte intégrée
hotte de cuisine fixée sur ou dans un meuble

3.4
four micro-ondes à hotte intégrée
extracteur de fumée de cuisine intégré dans un four micro-ondes

3.5
hotte combinée multiple
extracteur de fumée de cuisine où le ventilateur est monté séparément de l'appareil, mais est commandé par celui-ci

3.6
extracteur vertical
extracteur de fumée de cuisine destiné à être installé à proximité d'un appareil de cuisson ou intégré à un appareil de cuisson, qui évacue les vapeurs par un conduit

Note 1 à l'article: Un **extracteur vertical** peut également être un système où le ventilateur est monté séparément de l'appareil, mais est commandé par celui-ci.

3.7
mode recyclage
mode de fonctionnement d'un **extracteur de fumée de cuisine**, où l'air aspiré est filtré par un **filtre de réduction d'odeurs** et est ensuite rejeté dans la pièce

3.8
mode extraction
mode évacuation
mode aspiration
mode de fonctionnement d'un **extracteur de fumée de cuisine**, où l'air aspiré est évacué à l'extérieur du bâtiment par des conduits

Note 1 à l'article: Le **mode extraction** est également appelé "mode évacuation" ou "mode aspiration".

3.9
tension assignée
tension attribuée à l'**extracteur de fumée de cuisine** par le fabricant

3.10
coefficient d'absorption des graisses
G_{FE}
pourcentage des graisses retenues à l'intérieur d'un **filtre à graisse**

3.11
filtre à graisse
composants dont la fonction est d'absorber les graisses et qui sont destinés à être remplacés ou retirés pour le nettoyage sans l'aide d'outils

3.12
filtre de réduction d'odeurs
composants dont la fonction est de réduire les odeurs

3.13
coefficient de réduction des odeurs
aptitude de l'**extracteur de fumée de cuisine** à réduire les odeurs

3.14
temps de dispersion des odeurs
temps nécessaire à la réduction des odeurs à un niveau défini après l'arrêt de la source de génération d'odeurs

3.15
réglage continu le plus élevé en utilisation normale
réglage de commande d'un **extracteur de fumée de cuisine** à la vitesse la plus élevée, hors **réglage de position de suralimentation**

Note 1 à l'article: Il s'agit du réglage marqué sur l'appareil et qui est décrit dans les instructions d'utilisation.

3.16
réglage de position de suralimentation
réglage de commande marqué à la vitesse maximale du ventilateur, dont le fonctionnement est automatiquement limité dans le temps

Note 1 à l'article: Il s'agit du réglage marqué sur l'appareil et qui est décrit dans les instructions d'utilisation.

3.17
réglage le plus bas
réglage de commande marqué qui génère la vitesse la plus faible de l'**extracteur de fumée de cuisine**

3.18
réglage automatique
réglage de commande de l'**extracteur de fumée de cuisine** où la vitesse du ventilateur est modifiée par un capteur ou par le temps

Note 1 à l'article: Les réglages automatiques ne sont pas utilisés pour le calcul du rendement dynamique des fluides (FDE, *fluid dynamic efficiency*).

3.19
point de fonctionnement
WP
point d'intersection de la courbe de pression/débit d'air et de la courbe de résistance – WP mesuré et compensé en fonction de la masse volumique de référence de l'air WP_C

3.20
système d'éclairage
appareils utilisés pour l'éclairage de la surface de cuisson, hors éclairage ambiant à moins qu'il n'existe qu'un seul interrupteur de commande

Note 1 à l'article: Les blocs d'alimentation et les régulateurs sont inclus.

3.21
éclairage
E_{moyen}
éclairage moyen du **système d'éclairage** sur la surface de cuisson, mesuré en lux, dans des conditions normalisées

3.22
réseau
infrastructure de communication présentant une topologie de liaisons, une architecture et comprenant des composants matériels, des principes organisationnels, des procédures et des formats (protocoles) de communication

Note 1 à l'article: La télécommande à infrarouge n'est pas considérée comme un **réseau**.

3.23
mode hors tension
état dans lequel l'appareil est branché sur le secteur, n'est ni en mode actif ni en mode veille et dans lequel ce mode peut être prolongé pendant un temps indéfini.

Note 1 à l'article: Les états suivants doivent également être considérés comme un mode hors tension:

a) états fournissant uniquement une indication de mode hors tension;

b) états fournissant uniquement des fonctionnalités visant à garantir la compatibilité électromagnétique.

3.24
mode veille
état dans lequel l'appareil est branché sur le secteur et assure uniquement les fonctions suivantes, qui peuvent se prolonger pendant un temps indéfini:

a) fonction de réactivation ou fonction de réactivation et simple indication de fonction de réactivation exécutable; et/ou

b) affichage d'informations ou du statut; et/ou

c) fonction de détection en vue de mesures d'urgence.

3.25
mode veille en situation de veille connectée
état dans lequel l'appareil est branché sur le secteur et assure uniquement la fonction de réactivation au moyen d'une connexion à un **réseau**, qui peut se prolonger pendant un temps indéfini.

Note 1 à l'article: Ce mode s'applique uniquement à des appareils qui fournissent une fonction de connexion à un **réseau**.

4 Classification

Selon le mode:

– **mode recyclage**;

– **mode extraction**.

Un **extracteur de fumée de cuisine** peut être construit de manière à regrouper les deux modes.

5 Liste des mesurages

L'aptitude à la fonction des appareils est évaluée sur la base des éléments suivants:

– dimensions hors tout;

– masse;

– mesure de la consommation des modes faible puissance;
– bruit aérien;
– débit d'air volumétrique;
– rendement dynamique des fluides;
– efficacité et puissance électrique d'entrée du **système d'éclairage**;
– aptitude à réduire les odeurs;
– aptitude à absorber les graisses.

6 Conditions de mesure générales

6.1 Local d'essai

Les essais sont effectués dans un local exempt de tout courant d'air. La température ambiante du local est maintenue à (23 ±2) °C. La pression absolue de l'air doit être comprise entre 91,3 kPa et 106,3 kPa.

6.2 Installation et positionnement

L'appareil doit être propre et ne doit comporter aucun résidu de matériau d'emballage ni film protecteur.

Tous les essais doivent être effectués en respectant l'ordre des articles du présent document et en utilisant un seul et même appareil.

L'**extracteur de fumée de cuisine** (hors **extracteur vertical**) est installé au-dessus d'un appareil de cuisson, à une distance de (600 ±10) mm. La distance est déterminée entre le niveau le plus bas de l'**extracteur de fumée de cuisine** et le niveau le plus haut de l'appareil de cuisson.

Tout mécanisme rétractable ou à bascule pouvant être ouvert dans une position pour l'utilisation normale conformément aux instructions du fabricant doit être ouvert pendant tous les essais. Les positions conçues uniquement pour le nettoyage et la maintenance ne doivent pas être prises en compte. Si les instructions du fabricant ne fournissent aucune information, le mécanisme rétractable ou à bascule doit être complètement fermé.

La position du mécanisme rétractable ou à bascule doit rester inchangée pour tous les essais, à l'exception des mesures des modes faible puissance de l'Article 8.

Si l'**extracteur vertical** peut être levé, les instructions du fabricant sont respectées; sinon, les mesures doivent être effectuées sur l'appareil dans sa position d'utilisation relevée au maximum.

Si différentes options sont fournies avec le **CFE**, il est alors nécessaire d'utiliser, pour tous les essais, la sortie d'air avec ses propriétés les plus proches d'une courbe de résistance théorique pour un conduit d'extraction avec b = 0,000 125. Cette configuration doit être conservée pour toutes les mesures décrites dans le présent document.

NOTE Le Tableau 3 fournit d'autres informations concernant b.

Tous les essais, à l'exception des mesures des modes faible puissance (voir Article 8), sont réalisés:

- avec les réglages d'usine par défaut, à l'exception de l'ajustement du mode extraction ou du mode recyclage, si nécessaire;
- en s'assurant qu'aucun **réseau** n'est connecté à l'appareil pendant toute la durée du mesurage.

Avant de procéder au mesurage, aucun conditionnement du **CFE** n'est admis, à moins que cela ne soit explicitement exigé dans le présent document.

S'assurer que tout **réglage automatique** est désactivé.

6.3 Alimentation électrique

L'**extracteur de fumée de cuisine** est alimenté à la **tension assignée** ±1 %. La tension d'alimentation doit être enregistrée au point où l'appareil est raccordé au secteur pendant tous les essais. Si l'appareil comporte une plage de **tensions assignées**, les essais sont effectués à la tension nominale du pays où l'appareil est destiné à être utilisé.

La fréquence d'alimentation doit être à la fréquence assignée ±1 % tout au long de l'essai. Si une plage de fréquences est indiquée, alors la fréquence d'essai doit être la fréquence nominale du pays où l'appareil est destiné à être utilisé.

6.4 Filtres

Pour l'ensemble des essais, il doit être vérifié que tous les filtres sont positionnés correctement.

Pour les appareils comportant plusieurs **filtres à graisse**, les filtres doivent être positionnés sans vides entre eux (positionnés de manière centrée).

6.5 Commande du ventilateur

Les **extracteurs de fumée de cuisine** doivent être soumis à l'essai avec le **réglage continu le plus élevé en utilisation normale**, comme indiqué dans les instructions du fabricant.

6.6 Instrumentation et mesurages

Les instruments utilisés et les mesurages effectués pour les besoins du présent document doivent satisfaire aux spécifications indiquées dans le Tableau 1 et dans le Tableau 2. La précision est appliquée à la valeur mesurée.

Tableau 1 – Instruments

Paramètre	Unité	Résolution minimale	Précision	Autres exigences
Masse	g	0,1 g	±0,5 g	
Température	°C	0,1 °C	±1,5 K	Couple thermoélectrique de type J ou K conforme à l'IEC 60584-1 ou Capteur PT100 conforme à l'IEC 60751.
Durée	s	1 s	±1 s	
Puissance	W	-	±1 %	
Éclairement	lx	-	±10 %	Valeur à l'étude – la Norme internationale relative au classement d'éclairement est en cours d'élaboration.
Pression/Pression de l'air	Pa	-	±1 %	La précision est appliquée aux pressions ≤ 150 Pa et d'au moins 1,5 Pa.

Tableau 2 – Mesurages

Paramètre	Unité	Précision	Autres exigences
Tension	V	±0,5 %	-
Débit d'air volumétrique	m^3/h	±2 %	
Mesure de la consommation		-	Conformément à l'IEC 62301

Si les nombres doivent être arrondis, l'arrondi doit être effectué au chiffre le plus proche conformément à l'ISO 80000-1:2009, Article B.3, Règle B. Si l'arrondi s'effectue à droite de la virgule, les chiffres supprimés ne doivent pas être remplacés par des zéros.

Les tolérances définies pour les paramètres dans le présent document, qui utilisent le symbole "±" indiquent les limites autorisées des écarts par rapport aux objectifs spécifiés en dehors desquelles l'essai ou les résultats ne sont pas valides. L'indication de tolérances ne doit pas être utilisée en vue d'un écart délibéré par rapport à ces objectifs spécifiés.

7 Dimensions et masse

7.1 Dimensions hors tout

Les dimensions hors tout de l'**extracteur de fumée de cuisine** sont mesurées. La largeur, la profondeur et la hauteur maximales (en tenant compte des boutons de commande ou de toutes autres saillies) sont exprimées en millimètres et arrondies à 10 mm près. Si les dimensions sont variables lorsque l'**extracteur de fumée de cuisine** est utilisé en fonctionnement normal, les dimensions minimales et maximales sont alors indiquées.

Pour les **extracteurs de fumée de cuisine** à **mode extraction**, les dimensions de l'orifice de sortie d'air sont mesurées et reportées.

7.2 Distance entre l'extracteur de fumée de cuisine et l'appareil de cuisson

La plus courte distance entre le niveau le plus bas de l'**extracteur de fumée de cuisine** (hors **extracteurs verticaux**) et le niveau le plus haut de l'appareil de cuisson est mesurée et exprimée en millimètres, arrondie à 10 mm près.

7.3 Masse

La masse de l'**extracteur de fumée de cuisine** (filtres, câble d'alimentation et fiche compris) est mesurée et reportée en kilogrammes, arrondie à une décimale.

8 Mesure de la consommation des modes faible puissance

8.1 Objet et combinaison d'appareils

Le présent article expose la détermination des modes **hors tension**, **veille** et **veille en situation de veille connectée**. D'autres modes faible puissance peuvent exister sur certains appareils, mais sur les modèles courants, ils ne sont pas considérés comme étant importants en ce qui concerne la durée et la consommation d'énergie.

8.2 Mesurage

8.2.1 Principes

Les exigences de l'IEC 62301 et de l'IEC 63474 doivent être observées, en plus des exigences suivantes.

Cependant, l'IEC 62301:2011, 5.3 (procédure) et l'exigence définissant la vitesse de l'air dans l'IEC 62301:2011, 4.2, ne doivent pas s'appliquer.

Pour les essais sur les appareils équipés d'une horloge, celle-ci doit être réglée sur l'heure et la date correctes, tel que spécifié dans les instructions.

Si le changement continu de l'heure affichée d'une horloge influe sur la consommation d'énergie, une période de mesurage de 24 h est nécessaire. La valeur moyenne résultant de ce mesurage est notée.

Si l'appareil comporte un capteur de luminosité ambiante, deux niveaux d'éclairement conformes à l'IEC 62301 doivent être mesurés pendant la période de 24 h (12 h par niveau).

Si une option permet à l'utilisateur d'éteindre l'affichage, le mode "allumé" et le mode "éteint" doivent être soumis à essai et consignés.

S'assurer que les conditions suivantes continuent à s'appliquer pendant toute la durée du mesurage:

- les instructions d'utilisation concernant l'installation, le fonctionnement et les réglages (le cas échéant) sont respectées;
- l'appareil doit être connecté au secteur pendant toute la durée de l'essai; dans le cas où l'appareil est fourni sans câble, un câble d'environ 1 m de long doit être utilisé;
- l'appareil ne présente aucun indicateur d'avertissement signalant une situation indésirable;
- les instructions du fabricant concernant la configuration de la connexion à un **réseau** (le cas échéant) sont respectées;
- le **réseau** est connecté à l'appareil (si nécessaire);
- après chaque interaction de l'appareil, un temps d'attente d'au moins 15 min est observé avant de commencer les mesurages; et

- il n'existe aucune interférence due à une quelconque interaction pendant le mesurage.

Certains appareils peuvent nécessiter des mises à jour logicielles visant à garantir la sécurité du fonctionnement du **réseau**. Il est recommandé d'autoriser l'installation de ces mises à jour et de les noter dans le rapport d'essai. Des mises à jour peuvent avoir lieu ou être requises après l'activation de la capacité du **réseau**. Ce processus de mise à jour peut influer sur la consommation d'énergie lors du mesurage. Le mesurage commence une fois que toutes les mises à jour logicielles ont été effectuées.

La consommation d'énergie nécessaire peut être déterminée en mesurant directement la puissance consommée pendant un certain laps de temps (au moins 10 min). Les données doivent être enregistrées selon des intervalles réguliers de 1 s au maximum tout au long de l'essai, à l'aide d'un enregistreur de données ou d'un ordinateur. La puissance moyenne est exprimée en watts et est arrondie à deux chiffres valides après la virgule.

La consommation d'énergie peut également être mesurée pendant un certain laps de temps (au moins 10 min) et la consommation électrique peut être calculée en divisant la consommation d'énergie mesurée (exprimée en Wh) par la durée du mesurage (exprimée en h). La puissance calculée est exprimée en W et est arrondie à deux chiffres valides après la virgule.

Les interactions de l'appareil en **mode actif** ne doivent pas être prises en compte pour le mesurage. Des instructions étape par étape concernant le mesurage des modes faible puissance figurent à l'Annexe B (Tableau B.1).

8.2.2 Détermination de la consommation électrique en mode hors tension

Ce paragraphe s'applique exclusivement aux appareils comportant un **mode hors tension**.

Il convient que l'appareil soumis à l'essai soit en **mode hors tension** conformément aux instructions du fabricant. Toutes les actions requises pour la mise en **mode hors tension** doivent être prises en compte.

Dans tous les cas, le **mode hors tension** doit être déterminé sur une période d'au moins 10 min. La consommation électrique du **mode hors tension** est la moyenne des données mesurées.

Si l'appareil comporte un **mode hors tension**, il convient qu'il soit décrit par le fabricant.

8.2.3 Détermination de la consommation électrique en mode veille

Ce paragraphe s'applique exclusivement aux appareils comportant un **mode veille**.

Il convient que l'appareil soumis à l'essai soit en **mode veille** conformément aux instructions du fabricant.

Dans tous les cas, le **mode veille** doit être déterminé sur une période d'au moins 10 min. La consommation d'énergie du **mode veille** est la moyenne des données mesurées.

Si l'appareil comporte un **mode veille**, il convient qu'il soit décrit par le fabricant.

8.2.4 Détermination de la consommation en mode veille en situation de veille connectée

Ce paragraphe s'applique exclusivement aux appareils comportant un **mode veille en situation de veille connectée**.

Pour les **appareils** avec connexion à un **réseau**, respecter les instructions du fabricant concernant la configuration de l'appareil et s'assurer que le **réseau** (par exemple: LAN ou WLAN) est connecté à l'appareil et activé.

La consommation d'énergie la plus élevée possible peut être atteinte lorsque l'appareil est non seulement connecté au **réseau**, mais également à une interface utilisateur à distance (application mobile). Éviter toute interaction avec l'interface utilisateur à distance pendant le temps d'attente de 15 min et le mesurage.

Dans tous les cas, le **mode veille en situation de veille connectée** doit être déterminé sur une période d'au moins 10 min. La consommation d'énergie du **mode veille en situation de veille connectée** est la moyenne des données mesurées.

S'assurer qu'aucun téléchargement ni aucune mise à jour n'est en cours pendant le mesurage.

Le rapport d'essai doit contenir la description de la connexion **réseau** utilisée.

9 Bruit aérien

Lorsqu'une mesure du bruit aérien est exigée, elle doit être prise conformément à l'IEC 60704-2-13.

NOTE L'IEC 60704-3 décrit une procédure possible pour la détermination statistique des valeurs de bruit déclarées.

10 Débit d'air volumétrique

10.1 Objet et configuration d'essai

L'objet de cet essai est de déterminer le débit d'air volumétrique.

Le mesurage du débit d'air volumétrique doit répondre aux exigences énoncées dans les normes ISO 5167-1, ISO 5167-2, ISO 5167-3 et ISO 5167-4.

La sortie d'air du **CFE** est raccordée à une chambre de compensation de pression conformément à la Figure 1 et au 6.2. Pour cela, le diamètre interne de la sortie d'air du **CFE** doit être mesuré. Le diamètre du conduit de raccordement doit être déterminé conformément au Tableau 3. Le conduit de raccordement doit être un conduit rigide et droit à paroi interne lisse. Un **CFE** sans conduit (**CFE** à **mode recyclage**, par exemple) est raccordé directement à la chambre de compensation de pression, comme indiqué à la Figure 1b).

La chambre de compensation de pression doit répondre aux exigences énoncées dans l'ISO 5801:2017, au 9.5, et à la spécification supplémentaire suivante: La dimension D4 de la chambre d'essai (voir ISO 5801) doit être supérieure ou égale à 750 mm. La distance J (voir ISO 5801) peut être limitée par un redresseur ou par la paroi de la chambre munie d'une zone de sortie.

Le point de prise de pression du manomètre de pression statique doit être situé à une distance égale à la moitié de J, avec une tolérance de ±50 mm (voir ISO 5801). S'il existe plusieurs points de prise de pression, tous les points doivent être situés dans cette distance, autour de la chambre. De plus, la moyenne des valeurs mesurées doit être calculée.