IEC 63086-1

Edition 1.0 2020-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical air cleaning appliances – Methods for measuring the performance
Part 1: General requirements

Appareils d'épuration d'air électriques domestiques et appareils similaires – Méthodes de mesure de l'aptitude à la fonction
Partie 1: Exigences générales

IEC 63086-1:2020-04(en-fr)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 23.120

ISBN 978-2-8322-8115-4

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CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Classification 8
4.1 Types of technologies used in air cleaners 8
4.2 Areas of placement for air cleaners 8
5 Conditions, instrumentation, and equipment for measurements 8
5.1 Measurements and calculations 8
5.2 General conditions 9
5.2.1 Test chamber conditions 9
5.2.2 DUT conditions 9
5.3 Test voltage and frequency 9
5.3.1 AC-powered DUT 9
5.3.2 DC-powered DUT 9
5.4 Sample plan 9
5.5 Test instrumentation 9
5.5.1 General 9
5.5.2 Thermometer 10
5.5.3 Hygrometer 10
5.5.4 Timer 10
5.5.5 Power supply 10
5.5.6 CO_2 detector 10
5.6 Test chamber 10
5.6.1 Structure of the 30 m^3 test chamber 10
5.6.2 Schematic of the test chamber 11
5.7 Placement of the DUT 13
5.7.1 General placement of the DUT 13
5.7.2 Placement of a floor type air cleaner 13
5.7.3 Placement of a table type air cleaner 13
5.7.4 Placement of a wall type air cleaner 13
5.7.5 Placement of a robotic air cleaner 13
5.7.6 Placement of a direct plug-in type air cleaner 13
5.7.7 Placement of an air cleaner not specified 13
6 Determination of the air exchange rate of the test chamber 13
6.1 Tracer gas 13
6.2 Setting the sampling point 13
6.3 Test chamber conditioning 13
6.4 Tracer gas introduction 14
6.5 Initial concentration 14
6.6 Data sampling 14
6.7 Decay of tracer gas 14
6.8 Decay constant 14
7 Measurement of noise 14
8 Energy efficiency 15
8.1 Energy efficiency in maximum performance operation mode 15

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8.2 Standby power 15
Annex A (informative) Determination of the test chamber mixing level 16
Annex B (normative) Standardization of calculations 17
B.1 Pollutant concentration 17
B.2 Slope of decay line 17
B.3 Clean air delivery rate (CADR) 17
B.3.1 Tabulation and calculation 17
B.3.2 Certification, verification or other formal reporting 17
Annex C (normative) Test stand for wall and direct plug-in type air cleaners 18
Bibliography 19

Figure 1 – Schematic of the 30 m^3 test chamber 12
Figure C.1 – Construction requirements for test stand for wall and direct plug-in type air cleaners 18

Table 1 – 30 m^3 test chamber 11

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HOUSEHOLD AND SIMILAR ELECTRICAL AIR CLEANING APPLIANCES – METHODS FOR MEASURING THE PERFORMANCE

Part 1: General requirements

FOREWORD

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International Standard IEC 63086 has been prepared by IEC technical committee 59: Performance of household and similar electrical appliances.

This first edition cancels and replaces IEC PAS 62587 published in 2008.

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

FDIS	Report on voting
59/722/FDIS	59/725/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

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In this standard, the following print types are used:

– **terms defined in Clause 3: bold type**.

A list of all parts in the IEC 63086 series, published under the general title *Household and similar electrical air cleaning appliances – Methods for measuring the performance* can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEaC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
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HOUSEHOLD AND SIMILAR ELECTRICAL AIR CLEANING APPLIANCES – METHODS FOR MEASURING THE PERFORMANCE

Part 1: General requirements

1 Scope

This part of IEC 63086 applies to electrically powered household and similar **air cleaners** intended for use on rated single-phase AC input voltage circuits not exceeding 250 V and DC input voltage circuits not exceeding 48 V.

NOTE 1 See Clause 4 for examples of different technologies and placements of household and similar **air cleaners**.

NOTE 2 If the test methods in this document are applied to **combination products** (air conditioners, humidifiers, dehumidifiers, heaters, etc.) with air cleaning function, they are only aimed at their air cleaning function when tested.

NOTE 3 Battery-operated appliances are within the scope of this document. Dual-supply appliances, either mains-supplied or battery-operated, are regarded as battery-operated appliances when operated in the battery mode.

NOTE 4 This document is not applicable to:

- appliances intended exclusively for industrial purposes;
- appliances intended for use in medical treatment locations, such as surgical suites, laboratories, medical treatments rooms, etc.
- household range hoods or cooking fume extractors – see IEC 61591.

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 60704 (all parts), *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise*

IEC 62301:2011, *Household electrical appliances – Measurement of standby power*

3 Terms and definitions

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

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

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

3.1
air cleaner
electrically powered household, or similar, appliance that employs one or multiple technologies to reduce one or more types of indoor air pollutants

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3.2
robotic air cleaner
air cleaner that operates and changes its physical location autonomously without user intervention

Note 1 to entry: The **robotic air cleaner** can consist of a part that houses the air cleaning function and can have a docking station and/or other accessories to assist its operation.

3.3
fresh-air air cleaner
air cleaner connected to the external environment, which provides pollutant-reduced outdoor air into an indoor space

Note 1 to entry: The **fresh-air air cleaner** can also include other auxiliary functions, such as heat exchange.

3.4
combination products
air cleaner that includes a secondary function besides air cleaning within the same housing, such as humidifying, dehumidifying, heating, or air conditioning

3.5
DUT
device under test
air cleaner undergoing examination

3.6
test chamber
self-contained room with determined volume, shape, and dimensions, which is used to measure the performance of the **DUT**

3.7
target pollutant
specific air pollutant with defined components, including three main categories: particulate matter, gaseous pollutants, and microorganisms

3.8
operation decay rate
reduction rate of the **target pollutant** in the **test chamber**, due to operation of the **DUT**

Note 1 to entry: Units are per hour (h^{-1}).

3.9
CADR
clean air delivery rate
flow rate of clean air (with respect to the target pollutant) delivered by the **DUT** calculated as the product of the measured **operation decay rate** and the associated **test chamber** volume

Note 1 to entry: The unit is cubic metres per hour ($m^3\ h^{-1}$).

3.10
automatic operation mode
setting of the **DUT** chosen by the user in which the performance is regulated by the **air cleaner** without further user interaction

3.11
manual operation mode
setting of the **DUT**, chosen by the user, that is not influenced by further external operator interaction, air quality sensor data, and/or timers throughout the duration of the test

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3.12
maximum performance operation mode
manual operation mode where the **DUT** is set to the highest flow rate with all air cleaning functions switched on and set to maximum, where applicable

Note 1 to entry: If the **DUT** has zero flow rate, the **CADR** is measured with all air cleaning functions switched on.

Note 2 to entry: "All air cleaning functions switched on" implies that the requirements for testing are that all available filters, either for particle and gas filtration, or a combination of both, are inserted in the **DUT** for each type of test described in the applicable parts of IEC 63086-2.

3.13
energy efficiency in maximum performance operation mode
volume of cleaned air provided by consumption of a certain amount of energy calculated by dividing the **CADR** of the **DUT** by the electrical power input

Note 1 to entry: The unit is cubic metres per watt hour (m^3 W^{-1} h^{-1}).

4 Classification

4.1 Types of technologies used in air cleaners

According to the cleaning principles, the following types of technologies or combinations are used in air cleaning, but are not limited to:

- mechanical filtration type;
- physical and/or chemical adsorption type;
- chemical catalysis type;
- electrostatic filtration type;
- photocatalytic type;
- plasma type;
- ozone generating type;
- hydroxyl generating type;

4.2 Areas of placement for air cleaners

According to the installation modes described by the manufacturer, the following placement types exist for **air cleaners**, but are not limited to:

- floor type;
- table type;
- wall type;
- direct plug-in type;
- ceiling type;
- portable in-vehicle type;
- robotic type;
- fresh-air type

5 Conditions, instrumentation, and equipment for measurements

5.1 Measurements and calculations

All calculations and reporting of values shall use the methods of standardization of calculations, as described in Annex B.

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5.2 General conditions

5.2.1 Test chamber conditions

Unless otherwise specified, each test shall be conducted in the **test chamber** without influence of outside air, direct sunlight and other radiation effects.

The test temperature and acceptable range of variation shall be (23 ± 3) °C.

The test relative humidity and acceptable range of variation shall be (50 ± 10) %.

5.2.2 DUT conditions

5.2.2.1 DUT with manual operation mode

A **DUT** with **manual operation mode** shall be tested in accordance with the manufacturer's instructions in the **maximum performance operation mode**.

5.2.2.2 DUT with only automatic operation mode

A **DUT** with only **automatic operation mode** shall be tested in accordance with the manufacturer’s instructions.

NOTE A testing method for **DUT** with only **automatic operation mode** is under consideration and will be presented in the applicable parts of IEC 63086-2.

5.3 Test voltage and frequency

5.3.1 AC-powered DUT

The test voltage and frequency shall comply with the rated voltages and frequencies listed in IEC 62301:2011, Table 1. If the corresponding country or region is not included in the table, the voltage and frequency as stated by the manufacturer shall be used. In both cases, the test voltage and frequency shall be maintained at the rated voltage and frequency ±1 % throughout the duration of the test.

NOTE A stabilized power supply can be required to meet these requirements.

5.3.2 DC-powered DUT

The rated voltage as stated by the manufacturer shall be used. The test voltage shall be maintained at the rated voltage ±1 % throughout the duration of the test.

NOTE A stabilized power supply can be required to meet these requirements.

5.4 Sample plan

For increased confidence in the test results, a minimum of three samples of the **DUT** should be tested. Some performance tests can require additional samples or replacement parts if the performance is adversely impacted by testing. If additional samples or replacement parts are used, they shall be recorded in the report.

NOTE All measurements of performance within each test method of IEC 63086-2 are carried out on the same **DUT**.

5.5 Test instrumentation

5.5.1 General

All measurement instruments shall be operated in accordance with the manufacturer’s specification. The instruments shall meet the requirements in 5.5.2 to 5.5.6.

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5.5.2 Thermometer

The accuracy shall be within ±0,5 °C.

5.5.3 Hygrometer

The accuracy shall be within ±2 % RH.

5.5.4 Timer

The accuracy shall be within ±1 s in 24 h.

5.5.5 Power supply

5.5.5.1 General

The connection between the **DUT** and the power supply shall be made in such a way that an uninterruptable power supply is guaranteed throughout the duration of the test.

5.5.5.2 AC power supply

The AC power supply shall comply with IEC 62301:2011, 4.3.2.

5.5.5.3 DC power supply

The power supply is a DC stabilized supply.

5.5.5.4 Power meter

The power meter shall comply with IEC 62301:2011.

5.5.6 CO_2 detector

The accuracy shall be within ±3 % of reading or ±50 ppm (parts per million), whichever is greater. The resolution shall be 1 ppm.

5.6 Test chamber

5.6.1 Structure of the 30 m^3 test chamber

The parameters of the 30 m^3 test chamber are described in Table 1.

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Table 1 – 30 m^3 test chamber

Items	Parameters
Interior volume	(30 ± 1,5) m^3
Interior dimensions	Height = (2,5 ± 0,1) m The width shall be within 85 % and 100 % of the length.
Surfaces	All surfaces shall be low-adsorptive, chemically inert, non-corrosive, easy to clean, and with sufficient structural integrity. Recommended material for the walls, ceiling and floor: stainless steel AISI grades 304, 310, or 316, glass or equivalent. All conducting surfaces shall be grounded.
Sealing material	Welding, silicon rubber strip material, and low-emission glass sealant may be used, where necessary.
Mixing fan	The ceiling-mounted mixing fan shall have a diameter of between 1,0 m and 1,4 m with three blades and a minimal airspeed of 1 ms^{-1}. The air speed shall be measured 0,5 m below the fan blade's surface and laterally halfway between the central axis and the blade's tip. Installation location: on the ceiling in the centre of the **test chamber**, with the distance of the highest point on the blades to the ceiling's surface of between 0,25 m and 0,5 m.
Recirculation fan	The wall-mounted recirculation fan shall have a flow rate of between 700 m^{3}h^{-1} and 800 m^{3}h^{-1}, and a maximum airspeed of 15 ms^{-1} measured at the centre of the fan exhaust at 0,5 m from the face. Installation location: 1,5 m above the floor of the **test chamber** and 0,4 m away from the wall measured at the centre of the fan exhaust, with the airflow exhaust not directed at the **DUT** and/or sample point.
Test chamber air treatment unit	The **test chamber** air treatment unit shall be used for conditioning of the air (i.e. temperature, humidity), and filtration of the target pollutant. It may be operated in recirculation mode or supply fresh air from the external environment.
Leakage rate	The air leakage rate shall be not greater than 0,05 h^{-1}, in accordance with the measurement procedure described in Clause 6.
Mixing level	The mixing level shall be greater than 95 %, in accordance with the procedure provided in Annex A.
NOTE 1 One example of the **test chamber** dimensions is 3,46 m length, 3,46 m width and 2,5 m height. NOTE 2 The dimensions shown above are for the 30 m^3 **test chamber**. Other size chambers are under consideration. NOTE 3 A test for **fresh-air air cleaners** is under discussion and development as an IEC 63086-2 standard.	

5.6.2 Schematic of the test chamber

A schematic of the 30 m^3 **test chamber** is shown in Figure 1 as an example.

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