

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Vacuum cleaners for commercial use – Methods for measuring performance

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IEC/PAS 62611:2009

<https://standards.iteh.ai/catalog/standards/sist/19329063-57dc-4e45-b664-f726e384c3f4/iec-pas-62611-2009>

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **XB**

ICS 97.080

ISBN 978-2-88910-815-2

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**VACUUM CLEANERS FOR COMMERCIAL USE –
METHODS FOR MEASURING PERFORMANCE**

FOREWORD

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IEC-PAS 62611 has been processed by subcommittee 59F: Floor treatment appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
59F/184/PAS	59F/185/RVD

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS is based on the 4th edition of IEC 60312 (*Vacuum cleaners for household use – Method of measuring the performance*), and has been adapted to the operating environment of commercial appliances.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

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INTRODUCTION

This PAS specifies provisional methods of measuring the performance of commercial vacuum cleaners for use in offices, shops and similar commercial establishments taking into account the differences in operation compared to household vacuum cleaners.

It is the intention of subcommittee SC 59F to review this PAS based on experience achieved and publish an International Standard on this subject.



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VACUUM CLEANERS FOR COMMERCIAL USE – METHODS FOR MEASURING PERFORMANCE

1 Scope

These test methods are applicable to vacuum cleaners for commercial use.

The purpose of this PAS is to specify essential performance characteristics of vacuum cleaners being of interest to the users and to describe methods for measuring these characteristics.

NOTE Due to the influence of environmental conditions, variations in time, origin of test materials and proficiency of the operator, most of the described test methods will give more reliable results when applied for comparative testing of a number of appliances at the same time, in the same laboratory and by the same operator.

For safety requirements, refer to IEC 60335-1, IEC 60335-2-2 and IEC 60335-2-69.

2 Normative references

The following referenced documents are indispensable for the application 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 60312, *Vacuum cleaners for household use – Methods of measuring the performance*

IEC 60704-1, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*

IEC 60704-2-1, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-1: Particular requirements for vacuum cleaners*

ISO 554, *Standard atmospheres for conditioning and/or testing – Specifications*

ISO 679, *Cement – Test methods – Determination of strength*

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*

EN 1822, *Classification of HEPA and ULPA filters*

ASTM F2608, *Total emissions of a vacuum cleaner*

ASTM F1977, *Fractional filtration efficiency of a vacuum cleaner*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply:

3.1

cleaning head

plain nozzle or a brush attached to a connecting tube, or a power nozzle, separate or part of the cleaner housing, and that part of a vacuum cleaner which is applied to a surface to be cleaned

3.2

power nozzle

cleaning head provided with an agitation device to assist dirt removal. The agitation device may be driven by an incorporated electric motor (motorized nozzle), an incorporated turbine powered by the air flow (air-turbine nozzle) or an incorporated friction or gear mechanism actuated by moving the cleaning head over the surface to be cleaned (mechanical nozzle)

3.3

self-propelled cleaning head

cleaning head provided with a propulsion mechanism

3.4

upright cleaner

vacuum cleaner with the cleaning head forming an integral part of or permanently connected to the cleaner housing, the cleaning head normally being provided with an agitation device to assist dirt removal and the complete cleaner housing being moved over the surface to be cleaned by means of an attached handle

3.5

double stroke

one forward and one backward movement of the cleaning head performed in a parallel pattern

3.6

forward stroke

forward movement of a stroke pattern

NOTE On test carpets, forward strokes are carried out in the direction of the carpet pile (direction of manufacture).

3.7

return stroke

backward movement of a stroke pattern

3.8

stroke length

distance between the two parallel lines defining the limits of a stroke pattern

3.9

stroke pattern

arrangement of the forward and return strokes on the surface to be cleaned

3.10

parallel pattern

stroke pattern where the forward and the return strokes are congruent and are carried out in the direction of the carpet pile (direction of manufacture) unless otherwise specified

3.11

commercial vacuum cleaner

mobile vacuum cleaner used in offices, shops and other similar commercial premises

3.12

multi-motor vacuum cleaners

vacuum cleaner with more than one vacuum motor in series

3.13

industrial vacuum cleaner

vacuum cleaner used in an environment where industrial processes take place and skilled operation is required.

3.14**test width**

outside width of the cleaning head less 20 mm

3.15**active depth of the cleaning head**

distance from the front edge of the cleaning head to its rear edge or a line 10 mm behind the rear edge of the suction opening on the underside of the cleaning head, whichever is the shortest

3.16**stroke speed**

speed of the cleaning head, moved as uniformly as possible, during a forward or a return stroke

3.17**cleaning cycle**

for a given measurement, the sequence of forward and return strokes to be carried out at a specified stroke speed over the test area according to the appropriate stroke pattern

3.18**vacuum cleaner**

electronically operated appliance that removes dry material (dust, fibre, threads) from the surface to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and the cleaned suction air is returned to the ambient

3.19**wet cleaning appliance**

electrically operated appliance that removes dry and/or wet material (soil) from the surface to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and the cleaned suction air is returned to the ambient

3.20**passive nozzle**

cleaning head without any agitation devices

3.21**cleaning head width**

the external maximum width of the cleaning head in mm

4 General conditions for testing**4.1 Atmospheric conditions**

Unless otherwise specified, the test procedures and measurements shall be carried out under the following conditions (in accordance with ISO 554):

Standard atmosphere 23/50

Temperature: (23 ± 2) °C

Relative humidity (50 ± 5) %

Air pressure: 86 kPa to 106 kPa

NOTE Temperature and humidity conditions within the specified ranges are required for good repeatability and reproducibility. Care should be taken to avoid changes during a test.

For test procedures and measurements which may be carried out at other than standard atmospheric conditions, the ambient temperature shall be maintained at $(23 \pm 5) ^\circ\text{C}$.

4.2 Test equipment and materials

To minimize the influence of electrostatic phenomena, measurements on carpets shall be carried out on a flat floor consisting of a smooth untreated pine plywood or equivalent panel, at least 15 mm thick and of a size appropriate for the test.

Equipment and materials for measurements (devices, test carpets, test dust etc.) to be used in a test shall, prior to the test, be kept for at least 16 h at standard atmospheric conditions according to 4.1.

NOTE It is recommended that carpets that are already being used shall be stored unbeaten at standard atmospheric conditions according to 4.1. When not in use they should be hanging free, not lying or rolled.

4.3 Voltage and frequency

Measurements shall be carried out at rated voltage with a tolerance of $\pm 1\%$ and, if applicable, at rated frequency.

Vacuum cleaners designed for d.c. only shall be operated at d.c. Vacuum cleaners designed for both a.c. and d.c. shall be operated at a.c. Vacuum cleaners not marked with rated frequency shall be operated at either 50 Hz or 60 Hz, as is common in the country of use.

For vacuum cleaners with a rated voltage range, measurements shall be carried out at the mean value of the voltage range if the difference between the limits of the range does not exceed 10 % of the mean value. If the difference exceeds 10 % of the mean value, measurements shall be carried out both at the upper and lower limits of the voltage range.

If the rated voltage differs from the nominal system voltage of the country concerned, measurements carried out at rated voltage may give test results misleading for the consumer and additional measurements may be required. If the test voltage differs from the rated voltage, this shall be reported.

4.4 Running-in of vacuum cleaner and attachments

Prior to the initial test, the vacuum cleaner, wet cleaning appliances and their attachments, if any, shall be kept running with unrestricted air flow for at least 2 h to ensure adequate running-in. For upright cleaners or power nozzles, the agitation device shall be running but not in contact with the floor.

4.5 Equipment of the vacuum cleaner

If the vacuum cleaner is designed to be used with disposable dust receptacles, it shall, prior to each measurement, be equipped with a new dust receptacle of the type recommended or supplied by the manufacturer of the vacuum cleaner.

If the vacuum cleaner is provided with a permanent dust receptacle (as the sole original dust receptacle or as an enclosure for disposable dust receptacles), the dust receptacle shall, prior to each measurement, be cleaned by shaking or beating until its weight is within 1 % or 2 g of its original weight whichever is the lower. Brushing or washing of textile receptacles is not allowed; however, plastic receptacles may be washed and dried thoroughly. (A question has been raised as to whether this is still relevant in today's marketplace.)

Some permanent receptacles consist of a rigid container and an integral filter. In this case the container and the filter are considered to be the receptacle and should be treated as if they were a single component.

4.6 Operation of the vacuum cleaner

The vacuum cleaner and its accessories shall be used and adjusted in accordance with the manufacturer's instructions for normal operation for the test to be carried out. Height adjustment controls for the cleaning head shall be set as appropriate for the surface to be cleaned and the position noted. Any electrical controls shall be set for maximum continuous air flow and, unless the manufacturer's instruction states otherwise, any air by-pass openings for reduction of the suction power shall be closed.

NOTE This only applies to those air by-pass opening devices that may be operated by the user during normal operation. Any safety device shall be allowed to operate.

The tube grip of cleaners with suction hose or the handle of other cleaners shall be held as for normal operation at a height of (800 ± 50) mm above the test floor.

4.7 Conditioning prior to tests

The vacuum cleaner and attachments to be used shall then be kept running for at least 10 min under the provisions given in 4.4 to allow them to stabilise.

4.8 Initial application of dust

Prior to tests where the quantity of the dust collected is to be weighed, dust shall initially be applied to all parts of the vacuum cleaner through which the air passes before reaching the dust receptacle by carrying out, on the appropriate test surface, two preliminary measurements of dust removal, the results of which are not taken into account.

4.9 Mechanical operator

In order to achieve reliable results, certain measurements require the cleaning head to be moved at uniform speed over the test area and without exerting an additional force pressing the cleaning head against the test surface.

In such cases, it is recommended to simulate the handling of the vacuum cleaner by using a mechanical operator such as described in 7.2.12. The tube grip of cleaners with suction hose or the handle of other cleaners shall then be attached to the linear drive so that its centre pivots at a height of (800 ± 50) mm above the test surface. The linear drive may be motorized or operated by hand.

4.10 Number of samples

All measurements of performance shall be carried out on the same sample of the vacuum cleaner with its accessories and attachments, if any.

Tests carried out to simulate stresses a vacuum cleaner may be exposed to during normal use, possibly causing impairment of the cleaner's performance, may require additional samples of replaceable parts. Such tests shall be carried out at the end of the test programme.

4.11 In-house reference cleaner system(s)

Test carpets used in a laboratory for the determination of dust removal ability will, over time, change from their original conditions, for instance due to wearing or gradual filling with dust. It is therefore required that in-house reference cleaner system(s) be used to regularly check the carpet conditions as a verification of the test results obtained and being recorded.