



IEC 60312-1

Edition 1.1 2011-11

INTERNATIONAL STANDARD



**Vacuum cleaners for household use –
Part 1: Dry vacuum cleaners – Methods for measuring the performance**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **CQ**

ICS 97.080

ISBN 978-2-88912-738-2

CONTENTS

FOREWORD.....	4
INTRODUCTION (to amendment 1).....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 General conditions for testing	9
4.1 Atmospheric conditions.....	9
4.2 Test equipment and materials	10
4.3 Voltage and frequency	10
4.4 Running-in of vacuum cleaner.....	10
4.5 Equipment of the vacuum cleaner	10
4.6 Operation of the vacuum cleaner	11
4.7 Conditioning prior to each tests.....	11
4.8 Mechanical operator	11
4.9 Number of samples.....	11
4.10 In-house reference cleaner system(s)	12
5 Dry vacuum cleaning tests	12
5.1 Dust removal from hard flat floors	12
5.2 Dust removal from hard floors with crevices	14
5.3 Dust removal from carpets.....	15
5.4 Dust removal along walls	18
5.5 Fibre removal from carpets and upholstery.....	19
5.6 Thread removal from carpets	23
5.7 Maximum usable volume of the dust receptacle	24
5.8 Air data	25
5.9 Performance with loaded dust receptacle	27
5.10 Total emission while vacuum cleaning.....	29
5.11 Filtration efficiency of the vacuum cleaner.....	30
6 Miscellaneous tests	34
6.1 General	34
6.2 Motion resistance	35
6.3 Cleaning under furniture	35
6.4 Radius of operation	36
6.5 Impact resistance for detachable cleaning heads	37
6.6 Deformation of hose and connecting tubes.....	37
6.7 Bump test.....	38
6.8 Flexibility of the hose	40
6.9 Repeated bending of the hose	41
6.10 Life test	42
6.11 Mass	43
6.12 Weight in hand	43
6.13 Specific cleaning time.....	44
6.14 Dimensions	44
6.15 Noise level.....	44
6.16 Energy consumption	44

7	Test material and equipment.....	46
7.1	General	46
7.2	Material for measurements	47
7.3	Equipment for measurements	52
8	Instructions for use	67
	Annex A (informative) Information on materials.....	68
	Annex B (informative) Information at the point of sale	69
	Annex C (normative) Guidance specification on verified carpets	70
	Bibliography	72
	Figure 1 – Right-angled T.....	18
	Figure 2 – Determination of cleaning area	19
	Figure 3 – Stencil for distribution of fibres on test carpets	20
	Figure 4 – Zig Zag stroke pattern	21
	Figure 5 – Frame for test cushion.....	22
	Figure 6 – Stencil for distribution of fibres on upholstery	22
	Figure 7 – Arrangement of threads in the thread removal test	23
	Figure 8 – Stroke length in measurements.....	24
	Figure 9 – Air data curves	26
	Figure 10 – Connecting tube opening	27
	Figure 11 – Test dust for loading dust receptacle.....	28
	Figure 12 – Insertion depth.....	36
	Figure 13 – Position of test object and cross-section for measurement of deformation	38
	Figure 14 – Profile of threshold	39
	Figure 15 – Arrangements for bump test.....	39
	Figure 16 – Preparation of hoses for testing flexibility	41
	Figure 17 – Equipment for repeated bending of hoses	42
	Figure 18 – Test plate with crevice	52
	Figure 19 – Carpet-beating machine.....	53
	Figure 20 – Carpet hold-downs and guides	54
	Figure 21 – Dust spreader and roller for embedding dust into carpets	54
	Figure 22 – Alternative A equipment for air data measurements.....	55
	Figure 23 – Measuring box for alternative A.....	56
	Figure 24 – Alternative B equipment for air data measurements.....	58
	Figure 25 – Test hood	62
	Figure 26 – Aerosol channel with sampling probe	63
	Figure 27 – Exhaust channel with sampling probe.....	63
	Figure 28 – Drum for impact test	65
	Figure 29 – Device for testing deformation of hoses and connecting tubes.....	66
	Figure 30 – Mechanical operator for the measurement of dust removal from carpets and of motion resistance	67
	Table 1 – Confidence limits of a Poisson distribution for 95 % - confidence range	33
	Table 2 – Graduation of 8 size classes for particle sizes 0,3 µm – 10 µm	64

INTERNATIONAL ELECTROTECHNICAL COMMISSION

VACUUM CLEANERS FOR HOUSEHOLD USE –**Part 1: Dry vacuum cleaners –
Methods for measuring the performance**

FOREWORD

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

This consolidated version of IEC 60312-1 consists of the first edition (2010) [documents 59F/195/FDIS and 59F/199/RVD] and its amendment 1 (2011) [documents 59F/206/CDV and 59F/207/RVC]. It bears the edition number 1.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 60312-1 has been prepared by subcommittee 59F: Floor treatment appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

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

A list of all the parts in the IEC 60312 series, under the general title *Vacuum cleaners for household use*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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

INTRODUCTION (to amendment 1)

The following changes to IEC 60312-1 concern Subclauses 5.5 and 5.9 and the related specifications in Subclauses 7.2.2 and 7.2.6.

The reason for this is due to the tightening of the specification to the cotton linters used in the test dust. In order to reproduce the airflow restricting conditions expected during the development of this test it is necessary to use more test dust when Condition 3 is used as a stopping point. Further, it provides a specification for the cellulose dust.

In addition to this an updated specification of the cushion slip material is available.

VACUUM CLEANERS FOR HOUSEHOLD USE –

Part 1: Dry vacuum cleaners – Methods for measuring the performance

1 Scope

This International Standard is applicable for measurements of the performance of dry vacuum cleaners for household use in or under conditions similar to those in households.

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

NOTE 1 Due to 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.

NOTE 2 This standard is not intended for battery-operated vacuum cleaners.

For safety requirements, reference is made to IEC 60335-1 and IEC 60335-2-2.

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 60688, *Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals*

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, *Methods of testing cements – Determination of strength*

ISO 1763, *Carpets – Determination of number of tufts and/or loops per unit length and per unit area*

ISO 1765, *Machine-made textile floor coverings – Determination of thickness*

ISO 1766, *Textile floor coverings – Determination of thickness of pile above the substrate*

ISO 2424, *Textile floor coverings – Vocabulary*

ISO 2439, *Flexible cellular polymeric materials – Determination of hardness (indentation technique)*

ISO 3386-1, *Polymeric materials, cellular flexible – Determination of stress-strain characteristics in compression – Part 1: Low-density materials*

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 8543, *Textile floor coverings – Methods for determination of mass*

ISO 12103-1, *Road vehicles – Test dust for filter evaluation – Part 1: Arizona test dust*