

Edition 1.0 2010-09

# INTERNATIONAL STANDARD

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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE XB

ISBN 978-2-88912-179-3

### CONTENTS

FOI	REWC	PRD	4	
1	Scop	e	6	
2	Norm	ative references	6	
3	Term	s and definitions	7	
4	General conditions for testing			
	4.1	Atmospheric conditions	8	
	4.2	Test equipment and materials		
	4.3	Voltage and frequency	9	
	4.4	Running-in of vacuum cleaner	9	
	4.5	Equipment of the vacuum cleaner	9	
	4.6	Operation of the vacuum cleaner	10	
	4.7	Conditioning prior to each tests	10	
	4.8	Mechanical operator	10	
	4.9	Number of samples	10	
	4.10	In-house reference cleaner system(s)	11	
5	Dry vacuum cleaning tests			
	5.1	Dust removal from hard flat floors	11	
	5.2	Dust removal from hard floors with crevices	13	
	5.3	Dust removal from carpets	14	
	5.4	Dust removal along walls	17	
	5.5	Fibre removal from carpets and upholstery	18	
	5.6	Thread removal from carpets	22	
	5.7	Maximum usable volume of the dust receptacle	23	
	5.8	Air data	24	
	5.9	Performance with loaded dust receptacle	26	
	5.10	Total emission while vacuum cleaning	28	
	5.11	Filtration efficiency of the vacuum cleaner	28	
6	Misce	ellaneous tests	33	
	6.1	General	33	
	6.2	Motion resistance	34	
	6.3	Cleaning under furniture	34	
	6.4	Radius of operation	35	
	6.5	Impact resistance for detachable cleaning heads	36	
	6.6	Deformation of hose and connecting tubes		
	6.7	Bump test	37	
	6.8	Flexibility of the hose	39	
	6.9	Repeated bending of the hose	40	
	6.10	Life test	41	
	6.11	Mass	42	
	6.12	Weight in hand		
	6.13	Specific cleaning time		
	6.14	Dimensions		
		Noise level		
		Energy consumption		
7	Test	material and equipment	45	
	7.1	General	45	

7.2 Material for measurements	46
7.3 Equipment for measurements	
8 Instructions for use	
Annex A (informative) Information on materials	
Annex B (informative) Information at the point of sale	
Annex C (normative) Guidance specification on verified carpets	
Bibliography	70
Figure 1 – Right-angled T	
Figure 2 – Determination of cleaning area	
Figure 3 – Stencil for distribution of fibres on test carpets	19
Figure 4 – Zig Zag stroke pattern	20
Figure 5 – Frame for test cushion	21
Figure 6 – Stencil for distribution of fibres on upholstery	21
Figure 7 – Arrangement of threads in the thread removal test	22
Figure 8 – Stroke length in measurements	23
Figure 9 – Air data curves	25
Figure 10 – Connecting tube opening	26
Figure 11 – Test dust for loading dust receptacle	27
Figure 12 – Insertion depth	35
Figure 13 – Position of test object and cross-section for measurement of deformation	
Figure 14 – Profile of threshold	38
Figure 15 – Arrangements for bump test	38
Figure 16 – Preparation of hoses for testing flexibility	40
Figure 17 – Equipment for repeated bending of hoses	41
Figure 18 – Test plate with crevice	50
Figure 19 – Carpet-beating machine	51
Figure 20 – Carpet hold-downs and guides	52
Figure 21 – Dust spreader and roller for embedding dust into carpets	52
Figure 22 – Alternative A equipment for air data measurements	53
Figure 23 – Measuring box for alternative A	54
Figure 24 – Alternative B equipment for air data measurements	56
Figure 25 – Test hood	60
Figure 26 – Aerosol channel with sampling probe	61
Figure 27 – Exhaust channel with sampling probe	61
Figure 28 – Drum for impact test	63
Figure 29 – Device for testing deformation of hoses and connecting tubes	64
Figure 30 – Mechanical operator for the measurement of dust removal from carpets and of motion resistance	65
Table 1 – Confidence limits of a Poisson distribution for 95 % - confidence range	32
Table 2 – Graduation of 8 size classes for particle sizes 0.3 μm – 10 μm	62

#### 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.
- 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.

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.

The text of this standard is based on the following documents:

FDIS	Report on voting
59F/195/FDIS	59F/199/RVD

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

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 this publication 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.

#### 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