

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Surface cleaning appliances –
Part 2: Dry vacuum cleaners for household or similar use – Methods for
measuring the performance**

**Appareils de nettoyage des sols –
Partie 2: Aspirateurs à sec à usage domestique ou analogue – Méthodes
de mesure de l'aptitude à la fonction**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Surface cleaning appliances –
Part 2: Dry vacuum cleaners for household or similar use – Methods for
measuring the performance**

**Appareils de nettoyage des sols –
Partie 2: Aspirateurs à sec à usage domestique ou analogue – Méthodes
de mesure de l'aptitude à la fonction**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 97.080

ISBN 978-2-8322-3597-3

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD	7
1 Scope	10
2 Normative references	10
3 Terms and definitions	11
4 General conditions for testing	13
4.1 Atmospheric conditions	13
4.2 Test equipment and materials	14
4.2.1 General	14
4.2.2 Pile direction	14
4.3 Voltage and frequency	14
4.4 Running-in of dry vacuum cleaner	15
4.5 Equipment of the dry vacuum cleaner	15
4.6 Operation of the dry vacuum cleaner	15
4.7 Conditioning prior to each test	16
4.8 Mechanical operator	16
4.9 Number of samples	17
4.10 Carpets for testing	17
5 Dry vacuum cleaning tests	17
5.1 Dust removal from hard flat floors	17
5.1.1 Test equipment	17
5.1.2 Test area and stroke length	17
5.1.3 Removal of remaining dust	18
5.1.4 Distribution of test dust	18
5.1.5 Preconditioning of dust receptacle	18
5.1.6 Determination of dust removal ability	19
5.2 Dust removal from hard floors with crevices	19
5.2.1 Test equipment	19
5.2.2 Distribution of test dust	20
5.2.3 Determination of dust removal ability	20
5.3 Dust removal from carpets	20
5.3.1 Test carpet	20
5.3.2 Test area and stroke length	21
5.3.3 Conditioning of test carpet	21
5.3.4 Distribution of test dust	22
5.3.5 Embedding of dust into carpet	22
5.3.6 Preconditioning of dust receptacle	22
5.3.7 Determination of dust removal ability	23
5.4 Dust removal along walls	24
5.4.1 Test equipment and materials	24
5.4.2 Distribution of test dust	24
5.4.3 Determination of dust removal ability along walls	24
5.5 Fibre removal from carpets and upholstery	25
5.5.1 General	25
5.5.2 Fibre removal from carpets	25
5.5.3 Fibre removal from upholstery	27
5.6 Thread removal from carpets	29

5.6.1	Test carpet	29
5.6.2	Distribution of threads	30
5.6.3	Determination of thread removal ability	30
5.7	Maximum usable volume of the dust receptacle	31
5.7.1	General	31
5.7.2	Conditions for test	31
5.7.3	Introduction of moulding granules	32
5.7.4	Determination of maximum usable volume of dust receptacle	32
5.8	Air data	32
5.8.1	Purpose	32
5.8.2	Conditions for test	32
5.8.3	Test equipment	33
5.8.4	Mounting dry vacuum cleaner to test chamber for air data test	33
5.8.5	Determination of air data	33
5.9	Performance with loaded dust receptacle	34
5.9.1	Purpose	34
5.9.2	Determination of suction pressure change with loaded dust receptacle	34
5.9.3	Throttling to simulate loaded dust receptacle	37
5.9.4	Determination of performance with loaded dust receptacle	37
5.10	Total emissions while vacuum cleaning	37
5.10.1	Purpose	37
5.10.2	Test conditions	37
5.10.3	Test equipment	38
5.10.4	Test carpet	38
5.10.5	Test chamber setup and conditioning	38
5.10.6	Dry vacuum cleaners	38
5.10.7	Test sample and material setup	38
5.10.8	Positioning the test unit	38
5.10.9	Test procedure	39
5.11	Filtration efficiency and dust re-emission of the dry vacuum cleaner	39
5.11.1	Purpose	39
5.11.2	Test conditions	39
5.11.3	Determining the test dust quantity	40
5.11.4	Particle neutralization	40
5.11.5	Verification of particle transport	40
5.11.6	Test procedure	41
5.11.7	Evaluation	42
5.11.8	Particle concentration and dilution	43
5.11.9	Record keeping	44
6	Miscellaneous tests	44
6.1	General	44
6.2	Motion resistance	44
6.2.1	Purpose	44
6.2.2	Test carpet and test equipment	44
6.2.3	Determination of motion resistance	45
6.3	Cleaning under furniture	45
6.3.1	Purpose	45
6.3.2	Distribution of test dust	46

6.3.3	Determination of free furniture height	46
6.4	Radius of operation	46
6.4.1	Purpose	46
6.4.2	Conditions for measurement	46
6.4.3	Determination of radius of operation	46
6.5	Impact resistance for detachable cleaning heads	46
6.5.1	Purpose	46
6.5.2	Test equipment	46
6.5.3	Determination of impact resistance	46
6.6	Deformation of hose and connecting tubes	47
6.6.1	Purpose	47
6.6.2	Test equipment	47
6.6.3	Determination of permanent deformation	47
6.7	Bump test	48
6.7.1	Purpose	48
6.7.2	Test equipment	48
6.7.3	Test cycle	49
6.7.4	Test procedure	49
6.8	Flexibility of the hose	50
6.8.1	Purpose	50
6.8.2	Preparation of test object	50
6.8.3	Determination of the flexibility of the hose	51
6.9	Repeated bending of the hose	51
6.9.1	Purpose	51
6.9.2	Test equipment	51
6.9.3	Test method	52
6.10	Ability to maintain air flow performance	52
6.10.1	Purpose	52
6.10.2	Test dust	53
6.10.3	Test method	53
6.11	Mass	53
6.12	Weight in hand	53
6.13	Specific cleaning time	54
6.14	Dimensions	54
6.15	Noise level	54
6.16	Energy consumption	54
6.16.1	General	54
6.16.2	Energy consumption when vacuuming carpets	55
6.16.3	Energy consumption with vacuuming of hard floors and hard floors with crevices	56
6.17	Operational motor life-time test	57
6.17.1	Purpose	57
6.17.2	Test method	57
6.18	Rated input power	58
7	Test material and equipment	58
7.1	General	58
7.2	Material for tests	58
7.2.1	Test carpets	58
7.2.2	Standard test dust	60

7.2.3	Fibre material	62
7.2.4	Thread material	62
7.2.5	Moulding granules	63
7.2.6	Test cushion	63
7.3	Equipment for tests	63
7.3.1	Floor test plate	63
7.3.2	Test plate with crevice	63
7.3.3	Carpet-beating machine	64
7.3.4	Hold-downs and guides	65
7.3.5	Dust spreader	65
7.3.6	Rollers for embedding	66
7.3.7	Equipment for air data test	67
7.3.8	Test equipment for determining the fractional filtration efficiency of the dry vacuum cleaner	73
7.3.9	Device for motion resistance test	76
7.3.10	Device for impact test	76
7.3.11	Device for determination of deformation of hoses and connecting tubes	77
7.3.12	Mechanical operator	78
7.3.13	Weighing machine	79
7.3.14	Total emissions test	79
8	Instructions for use	80
Annex A (informative)	Information on materials	81
Annex B (informative)	Information at the point of sale	82
Annex C (normative)	Guidance specification on verified carpets	83
C.1	Wilton carpet (7.2.1.3.2)	83
C.1.1	General	83
C.1.2	Determining carpet pile direction	84
C.2	Category A (7.2.1.3.3)	85
C.3	Category B (7.2.1.3.4)	86
C.4	Category C (7.2.1.3.5)	86
Annex D (informative)	Reference vacuum cleaner system (RSB)	87
D.1	Purpose of the RSB	87
D.2	General description of the RSB	87
D.3	Specification of the RSB	88
D.4	Installation and use of the RSB	89
D.5	Use of RSB for correction of DPU values	89
Annex E (informative)	Re-calibration of the RSB	90
E.1	Procedure for the re-calibration at the manufacturer SLG	90
E.2	Correction method for calibration	90
E.3	Recorded DPU values at re-calibration	91
E.4	Procedure for checking the air-technical data by the user	92
Bibliography		94
Figure 1 – Right-angled T		24
Figure 2 – Determination of cleaning area		25
Figure 3 – Stencil for distribution of fibres on test carpets		26
Figure 4 – Zigzag stroke pattern		27

Figure 5 – Frame for test cushion	28
Figure 6 – Stencil for distribution of fibres on upholstery	28
Figure 7 – Arrangement of threads in the thread removal test.....	30
Figure 8 – Stroke length in tests	31
Figure 9 – Air data curves.....	34
Figure 10 – Connecting tube opening.....	35
Figure 11 – Test dust for loading dust receptacle	36
Figure 12 – Insertion depth	45
Figure 13 – Position of test object and cross-section for measurement of deformation	47
Figure 14 – Profile of threshold	48
Figure 15 – Arrangements for bump test	49
Figure 16 – Preparation of hoses for testing flexibility	50
Figure 17 – Equipment for repeated bending of hoses	52
Figure 18 – Test plate with crevice.....	64
Figure 19 – Carpet-beating machine	65
Figure 20 – Carpet hold-downs and guides	66
Figure 21 – Dust spreader and roller for embedding dust into carpets.....	66
Figure 22 – Alternative A equipment for air data tests	67
Figure 23 – Measuring box for alternative A.....	68
Figure 24 – Alternative B equipment for air data tests	70
Figure 25 – Test hood.....	74
Figure 26 – Aerosol channel with sampling probe.....	75
Figure 27 – Exhaust channel with sampling probe.....	75
Figure 28 – Drum for impact test.....	77
Figure 29 – Device for testing deformation of hoses and connecting tubes	78
Figure 30 – Mechanical operator for the measurement of dust removal from carpets and of motion resistance.....	79
Figure C.1 – Looking against pile direction.....	85
Figure C.2 – Looking with pile direction.....	85
Figure D.1 – RSB with passive and active nozzle and vacuum calibration test box.....	88
Table 1 – Confidence limits of a Poisson distribution for 95 % confidence range.....	43
Table 2 – Grain size distribution: Type 1 mineral dust	60
Table 3 – Cotton linters characteristics	61
Table 4 – Grain size distribution: Type 3 mineral dust	62
Table 5 – Nominal diameters of orifices	71
Table 6 – Graduation of eight size classes for particle sizes 0,3 µm to 10 µm	76

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SURFACE CLEANING APPLIANCES –**Part 2: Dry vacuum cleaners for household or similar use –
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.

International Standard IEC 62885-2 has been prepared by subcommittee 59F: Surface cleaning appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This first edition of IEC 62885-2 cancels and replaces IEC 60312-1:2010 and Amendment 1:2011. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60312-1:2010+AMD1:2011.

- a) New terms and definitions have been added in Clause 3.
- b) Subclauses 4.2 and 4.6 have been improved for better understanding.
- c) Subclause 4.10 has been reviewed and renamed "Carpets for testing".
- d) Subclause 5.1.6 has been improved.

- e) Figure 1 in 5.4.1 has been improved.
- f) Subclause 5.5.3.3 has been improved.
- g) Subclauses of 5.7 have been renumbered.
- h) Subclause 5.7.3, previously 5.7.2, has been improved.
- i) Subclause 5.8.2 has been improved and renamed.
- j) The test method in 5.9.2.3 has been updated.
- k) A new subclause 5.10 on total emissions while vacuum cleaning has been included.
- l) The method in 5.11.6 has been improved.
- m) Subclause 6.10 has been renamed “Ability to maintain air flow performance”.
- n) Subclauses of 6.16 have been renumbered.
- o) Subclause 6.16.2, previously 6.16.1, has been improved.
- p) New subclauses 6.16.3.5, 6.16.3.6 and 6.16.3.7 have been added.
- q) New subclauses 6.17 on operational motor life-time test and 6.18 on rated input power have been added.
- r) A new paragraph has been added in 7.2.1.5.
- s) In 7.3.2, the insert has been changed to aluminium.
- t) A new subclause 7.3.14 on total emissions test has been added.
- u) New Annexes D and E have been added.

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

FDIS	Report on voting
59F/304/FDIS	59F/308/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 62885 series, under the general title *Surface cleaning appliances*, can be found on the IEC website.

In this standard, the following print types are used:

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

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.

SURFACE CLEANING APPLIANCES –

Part 2: Dry vacuum cleaners for household or similar use – 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** which are of interest to users and to describe methods for measuring these characteristics.

NOTE 1 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.

NOTE 2 This standard is not intended for cordless vacuum cleaners.

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

A recommendation on information for the consumer at the point of sale is given in Annex B.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 60335-2-2, *Household and similar electrical appliances – Safety – Part 2-2: Particular requirements for vacuum cleaners and water-suction cleaning appliances*

IEC 60688, *Electrical measuring transducers for converting A.C. and D.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*

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*

ISO 679, *Cement – Test methods – 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*

3 Terms and definitions

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

3.1

dry vacuum cleaner

electrically operated appliance that removes dry material (e.g. dust, fibre, threads) from the surface to be cleaned by an air flow created by a vacuum developed within the unit, the removed material being separated in the appliance and the cleaned suction air being returned to the ambient air

3.2

upright vacuum cleaner

self-standing and floor-supported **dry 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

3.3

cleaning head

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

3.4

active nozzle

cleaning head provided with a driven agitation device to assist dirt removal

Note 1 to entry: 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)