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Interested committees:

Title: BS IEC 62885-2 Surface cleaning appliances

Part 2: Dry vacuum cleaners for household or similar use - Methods for measuring the performance

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



59F/488/CD

COMMITTEE DRAFT (CD)

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2024-02-09

CLOSING DATE FOR COMMENTS:

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59F/465/CD, 59F/473A/CC

IEC SC 59F : SURFACE CLEANING APPLIANCES

SECRETARIAT:

Sweden

SECRETARY:

Mr Ingvar Eriksson

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 61

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☒ ENVIRONMENT

☒ QUALITY ASSURANCE

☐ SAFETY

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TITLE:

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SURFACE CLEANING APPLIANCES –

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

FOREWORD

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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 second edition of IEC 62885-2 cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This second edition includes the following significant technical changes with respect to the previous edition:

- a) Inclusion of requirements for **water filter vacuum cleaners** throughout document
- b) Clause 4.6 on operation of the **dry vacuum cleaner** has been revised.
- c) Add new paragraph 4.11, consolidating test area and **stroke length** from 5.1.2, 5.3.2, 6.2.2 and 6.16.2.2. Added new 4.12 for **stroke speed**.
- d) Added debris pick-up test for hard floor and carpet. Includes new Annex E.

- e) Clause 6.2.2 – Clarification of the carpet to be used; reference 4.11 for test area. Remove restriction limiting carpets to motion resistance only. Clarify the use of a mechanical operator.
- f) A durability test for secondary hoses has been included.
- g) The informative annexes relating to the description and maintenance of the **reference vacuum cleaner system RSB** have been updated.

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

Draft	Report on voting
59F/434/FDIS	59F/438/RVD

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

The language used for the development of this International Standard is English.

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**.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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

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

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SURFACE CLEANING APPLIANCES –

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

1 Scope

This part of IEC 62885 is applicable for measurements of the performance of mains-operated and cordless **dry vacuum cleaners**, including **water filter vacuum cleaners** for household or similar use. Additional requirements for cordless dry vacuum cleaners are located in Annex G (Normative) of this standard.

NOTE 1 Measurements of the performance of mains-operated commercial **dry vacuum cleaners** are found in IEC 62885-8.

The purpose of this document 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 2 Due to the influence of environmental conditions, variations in time, origin of test materials and proficiency of the operator, some 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 3 The methods here can be applied with modifications for surface-cleaning product types or technologies not currently covered within the scope.

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 60688, *Electrical measuring transducers for converting A.C. and D.C. electrical quantities to analogue or digital signals*

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 TS 62885-1, *Surface cleaning appliances – Part 1: General requirements on test material and test equipment*

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 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.

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

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

3.2

active nozzle

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

Note 1 to entry: The agitation device can 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

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

cleaning head width

B

external maximum width of the **cleaning head**, in metres

3.5

cordless active nozzle

cleaning head provided on a mains-operated machine with an agitation device to assist dirt removal driven by a battery-operated motor

3.6

cylinder vacuum cleaner

portable **dry vacuum cleaner** having a nozzle separated from the cleaner housing by a hose; in use, only the nozzle is guided over the surface area to be cleaned

Note 1 to entry: These **dry vacuum cleaners** are generally floor-supported.

Note 2 to entry: The **dry vacuum cleaner** can have detachable passive or **active nozzles**, attachments, and **tubes** for both floor and above the floor cleaning.

3.7

double stroke

one forward and one backward movement of the **cleaning head** performed according to the appropriate **stroke pattern**

3.8

dry vacuum cleaner

electrically operated appliance that removes dry material (for example, dust, fibre, threads) from the surface to be cleaned by an air flow created by a vacuum developed within the unit, the

85 removed material being separated in the appliance and the cleaned suction air being returned
86 to the ambient air

87 **3.9**
88 **forward stroke**
89 forward movement of a **stroke pattern**

90 Note 1 to entry: On test carpets, **forward strokes** are carried out in the direction of the carpet pile.

91 **3.10**
92 **handheld cleaner**
93 **dry vacuum cleaner** that will not be used on the floor by the user from an erect standing
94 position

95 Note 1 to entry: The hand-held **dry vacuum cleaner** can also be used on stairs from a standing position.

96 **3.11**
97 **hybrid vacuum cleaner**
98 **dry vacuum cleaner** that can be either mains and/or battery-operated

99 **3.12**
100 **in-house reference vacuum cleaner**
101 electrically operated laboratory equipment designated for internal comparison within a
102 laboratory

103 **3.13**
104 **maximum operational power**
105 power level that the machine is not capable of exceeding in any operating condition set either
106 by the user or automatically by the appliance

107 **3.14**
108 **parallel pattern**
109 **stroke pattern** where the **forward strokes** and the **return strokes** are congruent and are
110 carried out in the direction of the carpet pile (direction of manufacture) unless otherwise
111 specified

112 **3.15**
113 **passive nozzle**
114 **cleaning head** without any driven agitation device

115 **3.16**
116 **reference vacuum cleaner system RSB**
117 electrically operated laboratory equipment intended to provide different laboratories with a
118 similarly constructed vacuum cleaner to measure the reference dust removal ability on carpets
119 for passive and **active nozzles** to improve the reproducibility of results

120 Note 1 to entry: The **reference vacuum cleaner system RSB** may be used with active or **passive nozzles**.

121 Note 2 to entry: The **reference vacuum cleaner system RSB** is not intended for tests other than dust pick-up from
122 Wilton test carpets.

123 Note 3 to entry: The **reference vacuum cleaner system RSB** is described in Annex C. Maintenance of the RSB is
124 described in Annex D.

125 Note 4 to entry: The **reference vacuum cleaner system RSB** is required for measurements in accordance with
126 legislation in the European Union.

127 **3.17**
128 **return stroke**
129 backward movement of a **stroke pattern**

130 **3.18**
131 **self-propelled cleaning head**
132 **cleaning head** provided with a propulsion mechanism

3.19**stroke**

single traverse of the **cleaning head** over the **test** area

3.20**stroke length**

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

3.21**stroke pattern**

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

3.22**stroke speed**

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

3.23**test**

entirety or superset of all **trials** and **trial** batches of all samples to be measured for a single **vacuum cleaner** model

3.24**trial**

single instance of a performance measurement carried out under identical conditions that can be repeated multiple times

3.25**tube**

rigid length or lengths of hollow pipe that connect the end of the hose to various vacuum cleaner accessories

Note 1 to entry: The **tube** may be of fixed length, in multiple parts or telescopic, passive or energized.

3.26**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

3.27**water filter vacuum cleaner**

dry vacuum cleaner that uses water as the main filter medium, whereby the suction air is forced through the water entrapping the removed dry material as it passes through

3.28**water filter system**

removable water filter components that are in contact with the water

3.29**side brush**

peripheral brush whose main function is to relocate the dust and debris along the floor and extend the cleaning reach beyond the **cleaning head width**

3.30**stick vacuum cleaner**

A definition for stick vacuum cleaner is under consideration

3.31**Universal nozzle**

cleaning head which is an **active** or **passive nozzle** that is used for cleaning hard floor or carpet, where the adaptation for the floor surface is made automatically or by means of a mechanical adjusting mechanism

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:

Standard atmosphere 23/50

Temperature: $(23 \pm 2) ^\circ\text{C}$

Relative humidity: $(50 \pm 5) \%$

Absolute air pressure: 91,3 kPa to 106,3 kPa

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 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**4.2.1 General**

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 equal to or larger than the test carpet.

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

Carpets that have already been used shall be stored unbeaten at standard atmospheric conditions in accordance with 4.1.

When not in use, carpets shall be hanging free, or lying flat, pile upwards and uncovered. Carpets shall not be rolled when stored between **tests**. Carpets that have been rolled shall be laid flat for a minimum of 16 h before use.

4.2.2 Pile direction

Machine or manufacturing direction is an indication of the projected pile direction for carpet production. Pile direction is what is important for dust pick-up (DPU) testing.

If the pile direction is clearly parallel to the test bed, as is required by the applicable **test** procedures, the carpet is acceptable for use for that **test**. If the pile direction is at an angle to the test bed, the laboratory will be required to decide as to that carpet panel's usability for relevant comparative testing.

NOTE The procedure for determining pile direction can be found in IEC TS 62885-1.

4.3 Voltage and frequency

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

Dry vacuum cleaners designed for DC only shall be operated on DC. **Dry vacuum cleaners** designed for both AC and DC shall be operated at AC. **Dry vacuum cleaners** not marked with rated frequency shall be operated at either (50 ± 1) Hz or (60 ± 1) Hz with a total harmonic distortion of $\leq 3\%$, as is common in the country of use.

For **dry 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 can give test results that are misleading for the consumer, and additional measurements can be required. If the test voltage differs from the rated voltage, this shall be reported.

4.4 Running-in of dry vacuum cleaner

Prior to the first **test** on a new **dry vacuum cleaner**, it shall be kept running with unrestricted air flow for at least 2 h to ensure adequate running-in. For **active nozzles**, the agitation device shall be running but not in contact with the floor.

Prior to conducting any series of **tests**, the age, condition, and history of the product shall be recorded.

4.5 Equipment of the dry vacuum cleaner

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

If the **dry vacuum cleaner** is provided with a reusable dust receptacle (as the sole original dust receptacle or as an enclosure for disposable dust receptacles), the dust receptacle and any additional filters removable without the aid of tools shall, prior to each measurement, be cleaned according to the manufacturer's instructions until its mass is within 1 % or 2 g of its original mass, whichever is the lower.

Some reusable 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.

For **dry vacuum cleaners** equipped with separation devices being part of the appliance, which are used to separate the dust from the air flow and/or having additional filters to be changed or cleaned by the user without the use of tools, the change in mass of such specific devices shall be taken into account for dust removal ability.

Dry vacuum cleaners with disposable or reusable dust receptacles may have secondary filtration stage devices which do not collect meaningful dust in removal ability **tests**, but which do impact on filtration and life **tests**. Replacement and/or maintenance of such devices shall be in accordance with relevant clauses and carried out in accordance with the manufacturer's instructions.

4.6 Operation of the dry vacuum cleaner

4.6.1 General

The grip of cleaners with suction hose or the handle of other cleaners shall be held at a height of (800 ± 50) mm above the test surface. Any telescopic **tubes** or sticks shall be extended to maximum length. For nozzles without pivoting connectors, it shall be ensured that the bottom of the **cleaning head** be made parallel with the test surface by adjusting the handle height within the tolerances. If this is not possible, the length of a telescopic **tube** or stick may be adjusted. Any adjustment shall be reported.

During measurements where the agitation device of an **active nozzle** is not used as in normal operation, the agitation device shall be running but not in contact with any surface.

The following wording regarding declaration and compliance shall also apply to IEC 60704-2-1: "For declaration and compliance purposes, related **tests** conducted on a surface type (carpet or hard surface with or without crevice) shall be conducted with the same **dry vacuum cleaner** setting configurations such as power, **cleaning head** and **cleaning head** setting."

Related **tests** are:

- **tests** measuring the dust removal from carpet, the debris removal from carpet, the energy consumption for cleaning a carpet, and the noise level on carpet.
- **tests** measuring the dust removal from hard floor with crevices, the debris removal from hard floor, the energy consumption for cleaning a hard floor with crevices, and the noise level on hard floor.

Unless otherwise specified, the **dry vacuum cleaner** setting configurations, such as power, **cleaning head** and **cleaning head** setting, shall be used, and adjusted in accordance with the manufacturer's instructions for the surface to be cleaned (e.g., carpet or hard floor) for the **test** to be carried out.

In the absence of unambiguous instructions within the manufacturer's instructions, the product shall be tested with settings that are in accordance with any explicitly clear text, symbol or pictogram that is identifiable on the product.

If, after following the above order of checks, the tester believes the device under test to be in a configuration that is ambiguous, or that multiple configurations are possible with no way to clearly determine which is the most suitable for a given task, then the manufacturer shall be contacted for additional guidance.

Complete details of the settings used for each cleaning task, such as suction power, height settings and the like shall be recorded in the **test** documentation.

If values for the performance of a product measured in accordance with this document are published/declared, e.g., in the technical documentation, accurate and unambiguous details of the settings that were used during the **test** procedure shall be provided.

NOTE Performance in other settings or combinations can differ from the results in the declaration settings, however this document does not address those results.

4.6.2 Operation of water filter vacuum cleaners, additional requirements

4.6.2.1 Determining the water loss

Prior to the preconditioning the water loss of the **water filter vacuum cleaner** shall be determined.

The **water filter vacuum cleaner** shall be run according to the manufacturer's instructions for a period of 10 min with the suction nozzle lifted 20 mm from the floor in accordance with 4.1. Before and after this running time of 10 min, the mass of the **water filter system** shall be measured with an accuracy of at least 0,1 g. This **trial** shall be repeated 3 times and an average of these 3 **trials** shall be noted.

Since ambient conditions have a significant influence on the water loss, standard conditions shall be carefully maintained.

4.6.2.2 Filter conditions

4.6.2.2.1 For dust and debris removal from hard flat floors and from carpets

If the value measured in accordance with 4.6.2.1 is lower than 0,1 g/min, the **water filter vacuum cleaner** shall be used in accordance with the manufacturer's instructions for the dust removal from hard flat floors and carpet.

The **water filter vacuum cleaner** should not be moved to minimize loss of water.

NOTE 1 The mass of water lost during the measuring time is low and has no relevant influence on the **test** result.

If the value measured in accordance with 4.6.2.1 is equal to or higher than 0,1 g/min and the **water filter vacuum cleaner** is equipped with a dust collection system that does not use water, this collection system shall be included to determine the dust and debris removal from hard flat floors and dust and debris removal from carpet.

The air data in accordance with 5.11 shall be measured with the **water filter system** used in accordance with the manufacturer's instructions. Then, the vacuum cleaner shall be equipped with the dust collection system without water and the maximum airflow shall be adjusted to $\pm 3\%$ of the measured values with the **water filter system**.

In all other cases, the dust and the debris removal from hard flat floors and from carpets shall be performed using the dust collecting box (see 7.3.15) as pre-filter system. The vacuum cleaner shall be used in accordance with the manufacturer's instructions.

The dust collecting box is equipped with a synthetic filter bag properly sized for the dust collecting box.

NOTE 2 The filter bag from the **reference vacuum cleaner system RSB** in accordance with 3.16 can be used. For measuring dust pick-up, the filter bag can be handled in the same way it is handled in the **reference vacuum cleaner system RSB**.

4.6.2.2.2 For all other tests with water filter vacuum cleaners

The vacuum cleaner and its attachments shall be used and adjusted in accordance with the manufacturer's instructions for normal operation for the **test** to be carried out.

4.7 Conditioning prior to each test

If the **dry vacuum cleaner** is unused and de-energized for more than 1 h, then the **dry vacuum cleaner** and attachments to be used shall be kept running for at least 10 min under the provisions given in 4.4 to allow for them to stabilize.

4.8 Mechanical operator

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

It is recommended to simulate the handling of the **dry vacuum cleaner** by using a mechanical operator such as that described in 7.3.12.

The linear drive may be motorized or operated by hand. The method of operation shall be reported.

4.9 Number of samples

All measurements of performance shall be carried out on the same sample(s) of the **dry vacuum cleaner** with its attachments, if any.

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

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

4.10 Carpets for testing

NOTE 1 The in-house reference cleaner referred to in this document is a product designated within a laboratory for internal comparison and is not suitable for inter-laboratory comparisons.

Test carpets used in a laboratory for the determination of dust removal ability will, over time, change from their original condition, for instance due to wear or gradual filling with dust. Therefore, the **in-house reference cleaner** as defined in 3.12 shall be used to regularly check the carpet conditions as a verification of the **test** results obtained and recorded.

If a **RSB reference vacuum cleaner system RSB** as defined in 3.16 is present, this should be used for monitoring Wilton test carpet conditions by comparing the values for calibrated and reference dust pick-up, DPU_{cal} and DPU_{ref} , of the RSB.

NOTE 2 DPU_{cal} and DPU_{ref} are defined in Clause C.5.

If the difference between DPU_{cal} and DPU_{ref} is greater than 5 percentage points, it is recommended to:

- replace the carpet, and/or
- re-adjust the RSB, and/or
- check the laboratory conditions and testing procedure.

Given that dust pick-up ability can differ between carpets used for **active nozzles** or **passive nozzles**, the result from **tests** between **active nozzles** and **passive nozzles** shall not be compared.

Test carpets designated for testing of **passive nozzles** shall only be cleaned with a **passive nozzle** on the face. Test carpets designated for testing **active nozzles** shall only be cleaned with an **active nozzle** on the face.

4.11 Stroke length and test area

Unless otherwise specified within the document, the length of the test area is (700 ± 5) mm and the width of the test area is equal to the **cleaning head width** (see 3.4).

A length of at least 200 mm shall be added before the beginning of the test area and at least 300 mm after the end of the test area in order to allow acceleration and deceleration of the **cleaning head**.

Thus, the **stroke length** is at least 1 200 mm for the given test length of 700 mm. The centre line of the front edge of the **cleaning head** is aligned to the centre line of the beginning of the acceleration area at the commencement of the **stroke**, allowing the distance of 200 mm to be used for acceleration. The **cleaning head** shall reach the end of the **stroke** when the rear edge of the **active depth of the cleaning head** is at least 200 mm past the end of the test area, thus allowing a suitable distance for deceleration. The **return stroke** is carried out in the same manner until the front edge of the **cleaning head** is once again lined up with the beginning of the acceleration length in front of the test area.

4.12 Stroke speed

Unless otherwise specified within the document, the **active depth of the cleaning head** shall move at uniform **stroke speed** ($0,50 \pm 0,02$) m/s and in a straight line over the test area.

For optimum control of the **double stroke** movement, an electromechanical operator (see 4.8) should be used.

Two hold-downs in accordance with 7.3.4 act as guides to keep the **cleaning head** in a straight line as it is moved over the test area and to ensure an undisturbed flow.

Dry vacuum cleaners equipped with a self-drive device shall be operated at the prescribed **stroke speed** of ($0,5 \pm 0,02$) m/s, if possible. Otherwise, the **stroke speed** will be determined by the **dry vacuum cleaner**.

5 Dry vacuum cleaning tests

5.1 Dust removal from hard flat floors

5.1.1 Test equipment

A floor test plate in accordance with 7.3.1 shall be used.

5.1.2 Test area and stroke length

The test area and **stroke length** are specified in 4.11, except that the test width is ($B - 0,02$ m). The **stroke speed** is specified in 4.12.

5.1.3 Removal of remaining dust

The hard surface shall be dry cleaned so that no dust remains prior to any subsequent **test**.

5.1.4 Distribution of test dust

Mineral dust – Type 1 in accordance with 5.2.1 of IEC TS 62885-1, shall be distributed with a mean coverage of 50 g/m^2 as uniformly as possible over the test area.

The amount of test dust to be used is calculated from the formula $(B - 0,02 \text{ m}) \times 0,7 \text{ m} \times 50 \text{ g/m}^2$, where B is the **cleaning head width** in metres and 0,7 m is the length of the test area.

5.1.5 Preconditioning of dust receptacle

In order to minimize the effects of humidity, the dust receptacle shall be preconditioned prior to each **trial** as follows.

The **dry vacuum cleaner** under **test** is equipped with a clean dust receptacle and allowed to run with an unimpeded air flow with the nozzle clear of the surface for 2 min or until input power has stabilized.

After the preconditioning, the dust receptacle, and any filters removable without tools are removed from the **dry vacuum cleaner** to be weighed. The mass shall be noted, and the items are replaced.

Since the **dry vacuum cleaner** air flow can have an effect on the mass of the dust receptacle during the 2-min preconditioning, the mass of the dust receptacle shall be allowed to stabilize before weighing.

The requirements of 4.6.2 shall be followed for **water filter vacuum cleaners**.

5.1.6 Determination of dust removal ability

Three separate **trials**, each comprising one **double stroke**, shall be carried out. After each **double stroke**, the **cleaning head** shall be lifted at least 50 mm clear of the surface before the **dry vacuum cleaner** is switched off.

After each **trial**, the surface of the test plate is wiped with a dry suitable cloth having good dust adherence, which is weighed before and after the wiping to determine the amount of dust remaining after the cleaning. Any dust pushed out of the test area shall be included. The dust removal ability in per cent is calculated as the mean value from the measurements.

The mean value for three **trials** $K_B(3)$ is calculated in accordance with the following formula:

$$K_B(3) = (K_{B1} + K_{B2} + K_{B3}) / 3$$

Where:

$$K_{Bi} = 100 \% \times (m_{di} - m_{ri}) / m_{di}$$

and

K_{Bi} is the mean dust removal for i^{th} **trial** expressed in %.

m_{di} is the dust quantity distributed on the test floor of the i^{th} **trial**, in g.

m_{ri} is the amount of dust wiped off with a suitable cloth of the i^{th} **trial**, in g.

The cloth shall be capable of removing a minimum of 99 % of the dust from the floor surface, and not leave any residue.

When the mean value is lower than 90 % and the range of measurements is greater than three percentage units, two additional **trials** are carried out and the mean value of all the measurements should be given as the result.

When the mean value is equal to or higher than 90 % and the range of the measurements is greater than $0,3 \times (100 \% - \text{mean value})$, two additional **trials** are carried out and the mean value of all the measurements shall be given as the result.

Consideration shall be given to the control of repeatability within the laboratory and the design or manufacture of the **dry vacuum cleaner** or **cleaning head** in order to ascertain whether any factors not previously observed may adversely affect the repeatability.

The requirements of 4.6.2 shall be followed for **water filter vacuum cleaners**.

5.2 Dust removal from hard floors with crevices

5.2.1 General

The cleaning effectiveness for dust removal from hard floor with crevices and hard floor with debris is measured using the appropriate vacuum cleaner settings, **cleaning head**, and **cleaning head** settings for the function. The settings used shall be recorded in the test report.

5.2.2 Test surface and crevice

The surface, in accordance with 7.3.2, consists of a wooden test plate incorporating a removable aluminium insert with a crevice, the angle between the crevice and the direction of **strokes** being 45°.

The test plate may be fitted to the test rig in accordance with 7.3.12 or, if being used for testing by hand, is placed upon the floor.

Two hold-downs in accordance with 7.3.4 act as guides to keep the **cleaning head** in a straight line as it is moved over the test area. The guides should have a distance of 10 mm from the surface to ensure an undisturbed flow.

5.2.3 Distribution of test dust

The insert is weighed, and its crevice thereafter filled with mineral dust – Type 1, in accordance with 5.2.1 of IEC TS 62885-1. After levelling the surface of the dust with a rubber scraper, the insert is again weighed and carefully replaced in the test plate, avoiding shaking.

The linear density of the dust inside the crevice shall be between 34,0 g/m and 29,0 g/m along the crevice's length. Otherwise, the filling shall be repeated.

The inserts are emptied of dust after the last **trial** of each **test**.

5.2.4 Determination of dust removal ability

The vacuum cleaner settings, **cleaning head** and **cleaning head** settings shall be in accordance with 4.6.1. **Stroke speed** is in accordance with 4.12.

During a **test**, the **cleaning head** is passed over the crevice by performing three **double strokes** in a **parallel pattern** at a **stroke speed** of $(0,50 \pm 0,02)$ m/s, keeping the **cleaning head** to the centre of the test plate. The quantity of dust removed from the crevice after three **double strokes** is determined as the difference in mass of the insert before and after cleanings, both values being recorded.

The dust removal ability, in per cent, is calculated in accordance with the following formula as the ratio of the quantity of dust removed to the quantity of dust in that part of the crevice which is determined by the **cleaning head width** (see 3.4) and accounting for the oblique angle of 45°:

$$k_{cri} = \frac{m_{Li} - m_{ri}}{m_{Li}} \left(\frac{L}{B} \right) \cos(45^\circ) \times 100 \%$$

Where:

k_{cri} is the dust removal ability for the i^{th} **trial**, in per cent;

m_{Li} is the dust quantity in the crevice before cleaning of the i^{th} **trial**, in g;

494 m_{r_i} is the dust quantity remaining in the crevice after cleaning of the i^{th} **trial**, in g;

495 L is the length of the crevice, in m;

496 B is the **cleaning head width**, in m.

497 Three separate **trials** shall be carried out to establish a mean value of the dust removal ability
498 for three **double strokes**. The mean value of dust removal ability for three **trials** is calculated
499 as follows:

$$500 \quad k_{\text{cr mean}} = \left(\frac{k_{\text{cr1}} + k_{\text{cr2}} + k_{\text{cr3}}}{3} \right)$$

501

502 NOTE It is possible to obtain a cleaning effectiveness of greater than 100% using this test.

503 **5.3 Debris removal from hard floors**

504 **5.3.1 Test equipment**

505 The surface shall be in accordance with Annex E. The test area is in accordance with 4.11,
506 except that test width is $(B - 0,02)$ m.

507 Two hold-downs in accordance with 7.3.4 act as guides to keep the **cleaning head** in a straight
508 line as it is moved over the test area. The guides should be spaced 10 mm above the surface
509 to ensure an undisturbed air flow.

510 **5.3.2 Test surface**

511 The **test surface** is specified in Annex E and Figure E.1. The **test surface** shall be mounted
512 on 18 mm plywood or MDF. When plywood is used, it is important that it remains flat. The
513 deviation shall be $< 1\text{mm/m}$. Flatness may be checked using any suitable means.

514 NOTE Use of a straight edge for flatness may be considered suitable

515 The test surface layout shall be prepared as shown in Figure E.2.

516 **5.3.3 Distribution of debris**

517 Medium size debris, in accordance with IEC TS 62885-1:, 5.3 is weighed separately to the
518 nearest 0,05 g for each specified material. The theoretical total mass of debris (D_T) to be used
519 is calculated from the formula

$$520 \quad D_T = (B - 0,02 \text{ m}) \times 0,7 \text{ m} \times 30 \text{ g/m}^2$$

521 where:

522 B is the **cleaning head width**.

523 Measured D_M may vary from the theoretical value D_T due to the debris being used but should
524 be as close as possible to the theoretical value.

525 Note D_M represents the actual measured value of debris to be distributed.

526 Equal mass of separate debris materials shall be spread over the complete test area using any
527 convenient means. There should be no area of 5 cm diameter without any debris.

528 The test area is cleaned of remaining debris after each cleaning **trial**.

529 NOTE The debris can be reused provided it has been inspected and has not been damaged.

530 5.3.4 Determination of debris removal ability

531 The **dry vacuum cleaner** settings, **cleaning head** and **cleaning head** settings shall be the
532 same as in 5.2.1.

533 Conditioning of the dust receptacle shall be in accordance with 5.1.5. At the end of conditioning,
534 the dust receptacle shall be weighed, and its weight recorded ($WT_{Initial}$).

535 During a **trial**, the **cleaning head** is passed over the test area by performing three **double**
536 **strokes** at a **stroke speed** of $(0,50 \pm 0,02)$ m/s, keeping the **cleaning head** in the centre of the
537 test plate. The **stroke** shall begin in the acceleration area and the **stroke speed** shall remain
538 constant through the test area and into the deceleration area until the direction is reversed.

539 At the end of the final **stroke** the nozzle shall remain stationary outside the test area, and the
540 **dry vacuum cleaner** shall operate for an additional 5 s. During this period, the hose is agitated
541 to allow any debris within the vacuum cleaner to be collected in the dust receptacle while
542 avoiding picking up further debris around the nozzle. The dust receptacle is carefully removed
543 and weighed (WT_{Final}).

544 The debris removal ability K_d , in per cent, is calculated in accordance with the following formula:

545
$$K_{di} = \left(\frac{WT_{Final} - WT_{Initial}}{D_M} \right) \times 100\%$$

546 A minimum of five separate **trials** shall be run to determine the cleaning effectiveness in a given
547 direction of the beginning stroke. The mean cleaning effectiveness is calculated as

548
$$\bar{K}_d = \frac{K_{d1} + K_{d2} + \dots + K_{di}}{i}$$

549 Where:

550 i is the number of **trials** ($i \geq 5$);

551 K_{di} is the debris removal ability for the i^{th} trial (in %).

552 The number of **trials** used, and the given direction of the beginning **stroke** (forward or
553 backward) shall be recorded in the test report. Trials shall be repeated until results fall within
554 5% tolerance.

555 5.4 Dust removal from carpets

556 5.4.1 General

557 The cleaning effectiveness for carpet cleaning with dust and carpet cleaning with debris are
558 measured using the appropriate vacuum cleaner settings, **cleaning head** and **cleaning head**
559 settings. The settings used shall be recorded in the test report.

560 5.4.2 Test carpet and equipment

561 A test carpet, in accordance with IEC TS 62885-1, 4.1 shall be used; the type of carpet selected
562 shall be recorded. It shall have been prepared in accordance with IEC TS 62885-1, 4.3. Owing
563 to the significant influence of humidity on this **test**, the carpet shall be left in the test
564 environment at standard atmospheric conditions for at least 16 h before the **test** is due to
565 commence.

The preferred carpet for comparative testing purposes is the Wilton test carpet (see IEC TS 62885-1, 4.1). If additional carpet(s) are desired for testing, the carpet(s) shall be selected from those specified in 7.2.1.

During **trials**, the carpet is kept in position on the test floor by the use of carpet hold-downs (see 7.3.4). The carpet shall be fixed on the test floor at the end where the **forward stroke** starts. A force of 60^{+10}_{-0} N shall be applied at the other end of the test carpet to define the tension on the carpet during testing.

5.4.3 Test area and stroke length

The test area and **stroke length** are specified in 4.11, except that the test width is ($B - 0,02$) m. The **stroke speed** is specified in 4.12.

5.4.4 Conditioning of test carpet

5.4.4.1 General

Prior to each **trial**, the test carpet shall be cleaned to remove remaining dust and preconditioned as described in 5.4.4.2 and 5.4.4.3.

5.4.4.2 Removal of remaining dust

For cleaning of the test carpet, it is recommended to use a suitable carpet-beating machine such as that described in 7.3.3.

If the carpet-beating machine has a housing, the carpet shall be removed immediately after the **trial** to avoid drying of the carpet fibres.

If a carpet-beating machine is not used, the carpet shall be placed upside down on a rigid mesh support and be beaten by hand or with an **active nozzle**. After the beating, one **trial** with a **dry vacuum cleaner** having good dust removal ability should be carried out to remove the remaining dust. Test carpets designated for testing of **passive nozzles** shall only be cleaned with a **passive nozzle** on the face (although an **active nozzle** may be used on the back).

Whatever means is used to removing the remaining dust from the carpet, care must be taken to prevent damaging the backing.

5.4.4.3 Verification and preconditioning

After cleaning of the test carpet, the **dry vacuum cleaner** under **test** shall be equipped with a clean dust receptacle (see 4.5) and be used to verify that the carpet has been cleaned to the point where no dust pick-up is discernible. This point is considered to be reached if the amount of dust removed from the carpet during three **double strokes** is less than 0,2 g. If the amount is greater than 0,2 g, this step is repeated until the requirement is achieved.

NOTE Even if the equipment for removing remaining dust from the carpet is known to be sufficiently reliable to leave the carpet in an acceptable condition, it is still important to carry out this procedure of preconditioning to ensure that the effect of humidity on the carpet is minimized.

To prevent a gradual filling of the carpet with dust, the mass of the test carpet should be maintained as close as possible to that of the initially clean carpet.

The requirements of 4.6.2 shall be followed for **water filter vacuum cleaners**.

5.4.5 Distribution of test dust

Mineral dust – Type 2, in accordance with IEC TS 62885-1, 5.2.2 shall be distributed with a mean coverage of $(125 \pm 0,1)$ g/m² as uniformly as possible over the test area.

The amount of test dust to be used is calculated from the formula $(B - 0,02 \text{ m}) \times 0,7 \text{ m} \times 125 \text{ g/m}^2$, where B is the **cleaning head width** in metres and the length of the test area is 0,7 m. Any means of spreading the test dust may be used, provided it produces a uniform distribution of dust over the test area minus 10 mm on each side. One example of a dust spreading means is the dust spreader as described in 7.3.5. The adjustment of the device is checked by visual examination of the test dust on the carpet.

5.4.6 Embedding of dust into carpet

The dust shall be embedded into the test carpet by carrying out 10 **double strokes** over the carpet parallel with the direction of the pile with a roller, fabricated in accordance with 7.3.6.1. The speed of the roller over the test area shall be a uniform $(0,50 \pm 0,02)$ m/s with the **forward stroke** being in the direction of the pile. It is important to ensure that the test area is completely and evenly rolled.

5.4.7 Preconditioning of dust receptacle

Follow the procedure specified in 5.1.5.

5.4.8 Determination of dust removal ability

Prior to each **trial**, the sequence of preparations outlined in 5.4.5 to 5.4.7 shall be performed in total.

Three separate **trials**, each comprising three **double strokes**, shall be carried out. After the third **double stroke**, the **cleaning head** shall be lifted at least 50 mm clear of the carpet. At the end of each **trial**, all hoses and **tubes** of the **dry vacuum cleaner** shall be agitated before the **dry vacuum cleaner** is switched off. The dust receptacle shall not be removed before the motor has completely stopped.

Once the **dry vacuum cleaner** has completely stopped, the receptacle(s) and removable filters are carefully removed and reweighed. Due to effects of possible static charge build up during the time the **dry vacuum cleaner** is picking up dust, it is necessary to ensure that the receptacle has completely stabilized prior to recording the mass.

The dust removal ability is calculated as the ratio of the mass increase of the dust receptacle and removable filters as defined in 4.5 during the five **double strokes** to the mass of the test dust distributed on the test area. The mean value for three **trials** is calculated as follows:

$$K_T(3) = (K_{T1} + K_{T2} + K_{T3})/3$$

Where:

K_T is the dust removal ability

$$K_{T_i} = \frac{(m_{DRf_i} - m_{DRe_i})}{m_D} \times 100 \%$$

and

641 $K_T(3)$ is the mean dust removal of 3 **trials**, in %.

642 K_{T_i} is the dust removal for a single **trial** i , in %.

643 m_D is the mass of the dust distributed on the test area for a single **trial**, in g.

644 m_{DRe_i} is the total mass of the preconditioned dust receptacle(s) and removable filter(s) for
645 a single **trial**, in g.

646 m_{DRf_i} is the total mass of the dust receptacle(s) and removable filter(s) after five **double**
647 **strokes**, in g.

648 If the range of values for K_{T_i} is greater than three percentage points, two additional **trials** shall
649 be performed. In this case, the mean dust removal ability shall be calculated as follows:

650
$$K_T(5) = (K_{T1} + K_{T2} + K_{T3} + K_{T4} + K_{T5}) / 5$$

651 **EXAMPLE** The values for K_{T_i} of 75 %, 77 % and 79 % give a range of four percentage units. Thus, two additional
652 **trials** shall be carried out.

653 If a problem with the repeatability continues and a downward trend is observed with the results,
654 refer to 4.5 and consider the equipment being weighed during the **test**.

655 If the results of the first **trial** differ by more than 3 % from the following two **trials**, it is
656 permissible to repeat that test before applying the rules of the two additional **trials**.

657 For the dust removal ability, the mean value, the value range, and the number of **trials** shall be
658 recorded as well as the type of carpet used.

659 The requirements of 4.6.2 shall be followed for **water filter vacuum cleaners**.

660 **NOTE** For correction of dust removal figures using the **reference vacuum cleaner system RSB**, see Clause C.5.

661 **5.5 Debris removal from carpet**

662 **5.5.1 Test equipment**

663 The test carpet and conditioning shall be as described in 5.4.1 to 5.4.3. The test area is in
664 accordance with 4.11, except that the test area width is specified as $(B - 0,02 \text{ m})$.

665 Two hold-downs in accordance with 7.3.4 act as guides to keep the **cleaning head** in a straight
666 line as it is moved over the test area.

667 **5.5.2 Distribution of debris**

668 Medium size debris, in accordance with IEC TS 62885-1, 5.3 is weighed separately to the
669 nearest 0,05 g for each material. The theoretical total mass of debris (D_T) to be used is
670 calculated from the formula:

671
$$D_T = (B - 0,02 \text{ m}) \times 0,7 \text{ m} \times 30 \text{ g/m}^2$$

672 where:

673 B is the **cleaning head width**, in metres.

674 Measured D_M may vary from the theoretical value D_T due to the debris being used but should
675 be as close as possible to the theoretical value.

Note D_M represents the actual measured value of debris to be distributed.

Equal mass of separate debris materials shall be spread randomly over the complete test area using any convenient means. There should be no area of 5 cm diameter without any debris.

The test area is cleaned of remaining debris after each cleaning **trial**.

NOTE The debris can be reused provided it has been inspected and has not been damaged.

5.5.3 Determination of debris removal ability

The **dry vacuum cleaner** settings, **cleaning head** and **cleaning head** settings shall be in accordance with 4.6.1.

Conditioning of the dust receptacle shall be carried out in accordance with 5.1.5. At the end of conditioning, the dust receptacle shall be weighed, and its weight recorded ($WT_{Initial}$).

During a **trial**, the **cleaning head** is passed over the test area by performing three **double strokes** at a **stroke speed** of $(0,50 \pm 0,02)$ m/s, keeping the **cleaning head** in the centre of the test area. The **stroke** shall begin in the acceleration area and the **stroke speed** shall remain constant through the test area and into the deceleration area until the direction is reversed.

At the end of the final **stroke**, the nozzle shall remain stationary outside the test area, and the **dry vacuum cleaner** shall operate for an additional 5 s. During this period, the hose is agitated to allow any debris within the **dry vacuum cleaner** to be collected in the dust receptacle while avoiding picking up further debris around the nozzle. The dust receptacle is carefully removed and weighed (WT_{Final}).

The debris removal ability (K_D), in per cent, is calculated in accordance with the following formula:

$$K_{Di} = \left(\frac{WT_{Final} - WT_{Initial}}{D_T} \right) \times 100\%$$

A minimum number of five separate **trials** shall be run to determine the cleaning effectiveness in a given direction of the beginning stroke. The mean cleaning effectiveness is calculated as

$$\bar{K}_{dD} = \frac{K_{d1} + K_{d2} + \dots + K_{di}}{i}$$

Where:

i is the number of **trials** ($i \geq 5$);

K_D is the debris removal ability.

The number of **trials** used and the given direction of the beginning **stroke** (forward or backward) shall be recorded in the test report.

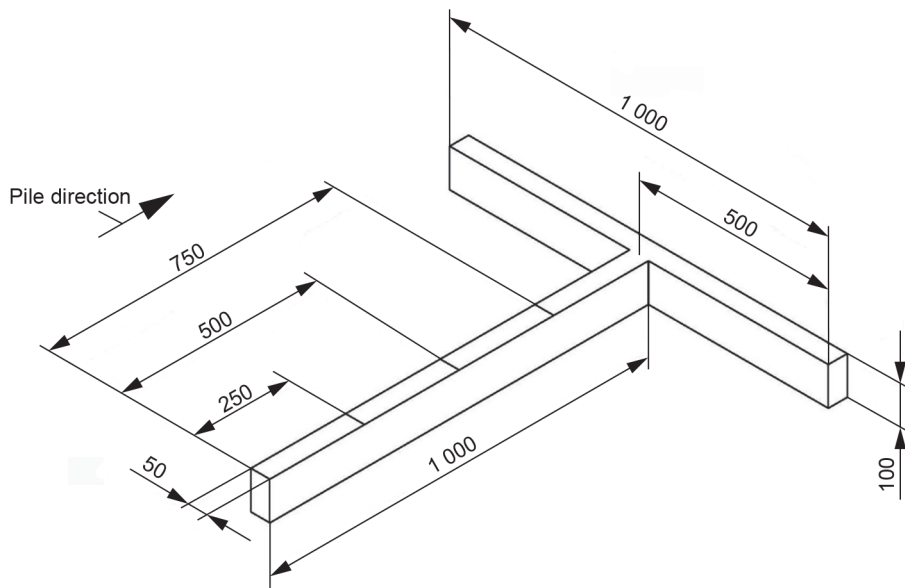
5.6 Dust removal along walls

5.6.1 Test equipment and materials

A right-angled T in accordance with Figure 1, formed by two pieces of wood or other suitable material, shall be used for this **test**. It shall be sufficiently heavy to remain in position during the **tests** or be kept in position using clamps or weights.

712

Dimensions in millimetres



713

714 Tolerances

715 Width and height dimensions: ± 5 mm

716 Scale dimensions: ± 1 mm

717

Figure 1 – Right-angled T

718 For **tests** on carpets, a Wilton test carpet in accordance with IEC TS 62885-1, 4.1 shall be
719 used. For **tests** on hard flat floors, a floor test plate in accordance with 7.3.1 shall be used.

720 **5.6.2 Distribution of test dust**

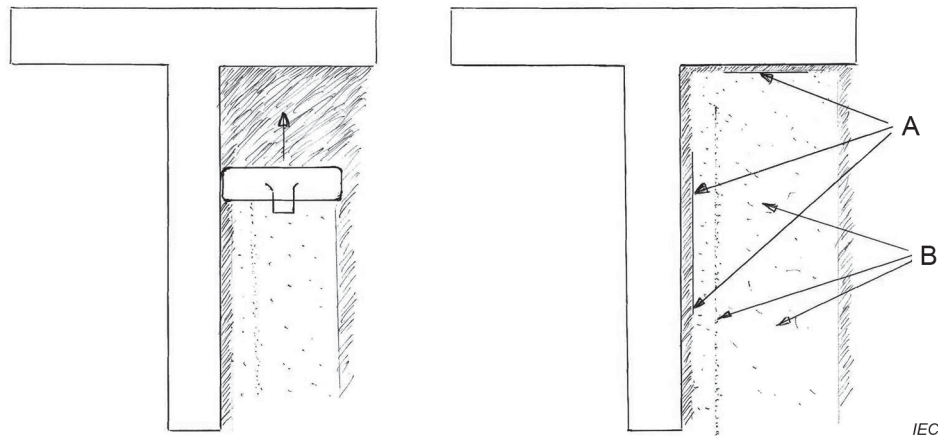
721 Mineral dust – Type 1, in accordance with IEC TS 62885-1, 5.2.1 shall be distributed over an
722 area of the test surface corresponding to the extremities of the T to ensure good visible
723 coverage.

724 **5.6.3 Determination of dust removal ability along walls**

725 The T is placed over the dust-covered area of the test surface and, if necessary, secured by
726 clamps or weights. When placed on a test carpet, the leg of the T shall be located parallel with
727 the direction of the carpet pile (see Figure 1).

728 One **double stroke** is carried out at a speed of $(0,25 \pm 0,05)$ m/s with the **cleaning head** guided
729 along both sides of the leg of the T, pausing for 2 s to 3 s at the end of the **forward stroke** to
730 define the limit of the front edge cleaning.

731 The width of the visible uncleaned area is measured at three equally spaced points along the
732 leg and along the crossbar of the T to establish, to the nearest millimetre, three mean values
733 representing the dust removal ability along both sides and in the front of the **cleaning head**, all
734 values being reported. See Figure 2 for guidance.



Shows **cleaning head** being moved forward through applied dust until the cross of the "T" is reached.

After **cleaning head** is removed, measurements are made where the dust is most undisturbed (**A**). Random remaining dust particles, or possibly where a belt guard is situated, are ignored (**B**).

Figure 2 – Determination of cleaning area

5.7 Fibre removal from carpets

5.7.1 General

The **dry vacuum cleaner** shall be equipped with the **cleaning head** designed for the surface to be cleaned.

5.7.2 Test carpet

A Wilton test carpet, in accordance with IEC TS 62885-1, 4.1 shall be used. Test carpets designated for fibre removal **tests** shall not be used for other **tests**.

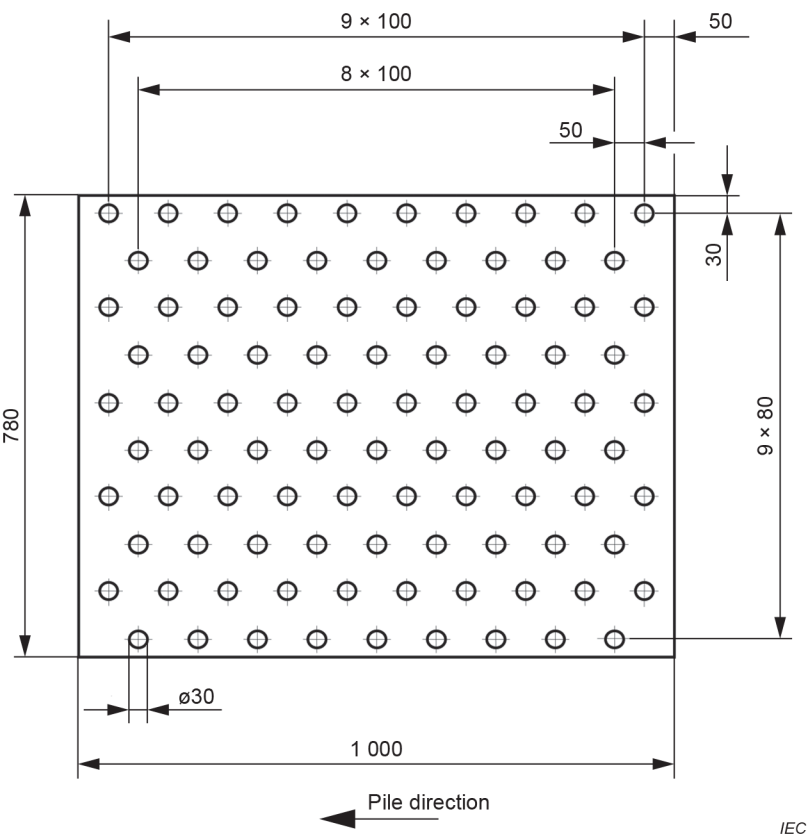
Prior to each **trial**, the surface of the test carpet shall be cleaned thoroughly until the carpet surface is visually free of remaining fibres.

5.7.3 Distribution of fibres

For the distribution of fibres, a stencil, in accordance with Figure 3, shall be used. The stencil shall be 3 mm in thickness, have 95 holes of 30 mm in diameter, and be free from burrs. The stencil shall be placed on the test carpet with its 1 000-mm long sides parallel to the pile direction.

751

Dimensions in millimetres



752

753

Figure 3 – Stencil for distribution of fibres on test carpets

754

755

756

(150 ± 5) mg of fibre material, in accordance with 7.2.3, shall be plucked by hand into 95 approximately equal portions, which are then pressed lightly by the thumb, without rubbing or twisting, in the centres of the holes of the stencil.

757

758

759

760

761

After removing the stencil, the fibres are embedded into the carpet by carrying out three **double strokes** with a roller, in accordance with 7.3.6.2. The direction of the **strokes** shall be at right angles to the pile direction of the carpet, and the **stroke speed** shall be about 0,5 m/s. If the roller is less than 1 m in length, the rolling schedule is repeated until the entire test area has been covered.

762

5.7.4 Determination of fibre removal ability from carpets

763

Prior to each **trial**, fibres sticking to the **cleaning head** shall be removed.

764

765

766

767

The **cleaning head** is passed once over the fibre-covered area in a zigzag pattern as shown in Figure 4 with the **forward strokes** at right angles to the pile direction. If **cleaning head width** is not an exact multiple of the test area width, make sure the final **stroke** ensures that the test area has been completely covered. The final stop position is shown in Figure 4.

768

769

The number of **double strokes** (N_{STR}) required for full geometrical coverage of the test area is calculated as follows:

770

$$N_{STR} = \frac{W_T}{B}$$

771

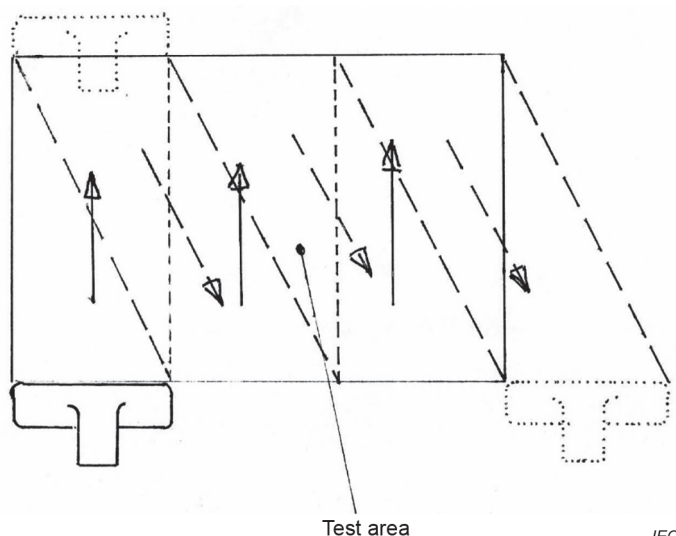
Where:

772 N_{STR} is the number of **double strokes**, rounded up to the next integer.

773 W_T is the test width (1 m).

774 B is the **cleaning head width**, in m.

775 Remaining fibres may then be removed by carrying out **strokes** in the direction of the pile not
 776 following a specific pattern. The **stroke speed** shall be $(0,5 \pm 0,05)$ m/s and care shall be taken
 777 that the **cleaning head** is in full contact with the test carpet during the cleaning.



778
779 **Figure 4 – Zigzag stroke pattern**

780 The cleaning time for fibre removal is the time needed for full geometric coverage of the test
 781 area plus the time needed for removal of the remaining fibres.

782 The time for full geometric coverage, t_c , in seconds, is calculated as follows:

783
$$t_c = N_{STR} \times \frac{L + \sqrt{B^2 + L^2}}{v_s}$$

784 Where:

785 L is the length, equal to the **active depth of the cleaning head** (m) + 0,78 m;

786 B is the **cleaning head width**, in m;

787 v_s is the **stroke speed**, in m/s.

788 The time to remove all fibres (judged visually by the operator from a standing position) shall be
 789 recorded. If the cleaning time exceeds 180 s, the cleaning is discontinued.

790 Three separate **trials** shall be carried out to establish a mean value of the fibre removal ability.
 791 The time to remove fibres sticking to the **cleaning head** shall not be taken into account.

792 **5.8 Fibre removal from upholstery**

793 **5.8.1 General**

794 The **dry vacuum cleaner** shall be equipped with the **cleaning head** designed for the surface
 795 to be cleaned.

5.8.2 Test cushion

A test cushion, in accordance with 7.2.6, shall be used. Prior to each **trial**, the surface of the test cushion shall be cleaned thoroughly until the cushion surface is visually free of remaining fibres.

The test cushion shall be placed in a wooden frame, in accordance with Figure 5, to give a working height of approximately 480 mm above the floor. The frame shall be provided with an adjustable stop strip, which shall rest on the test cushion and be immovable during the **trials**.

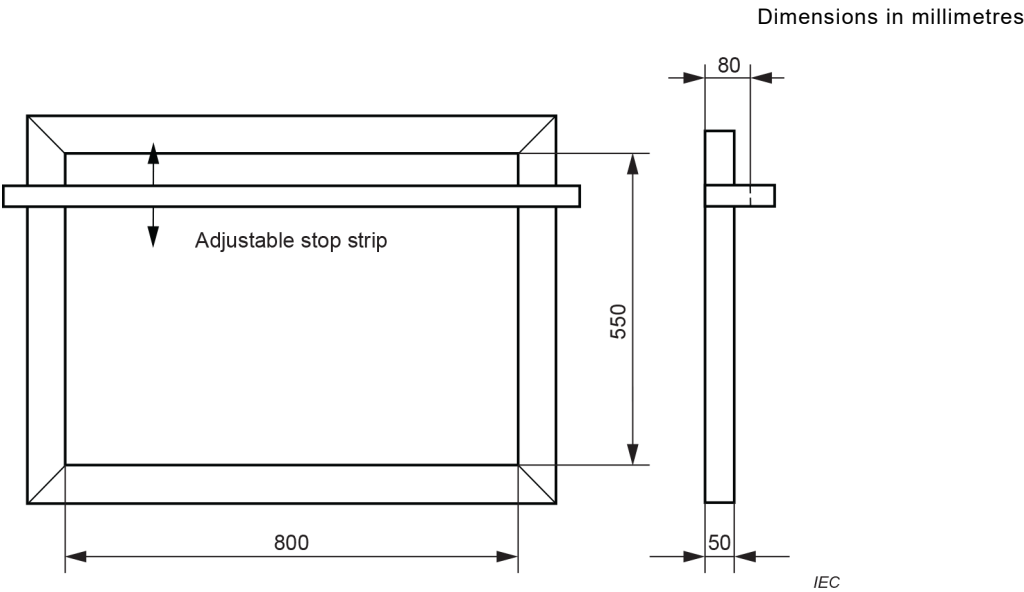


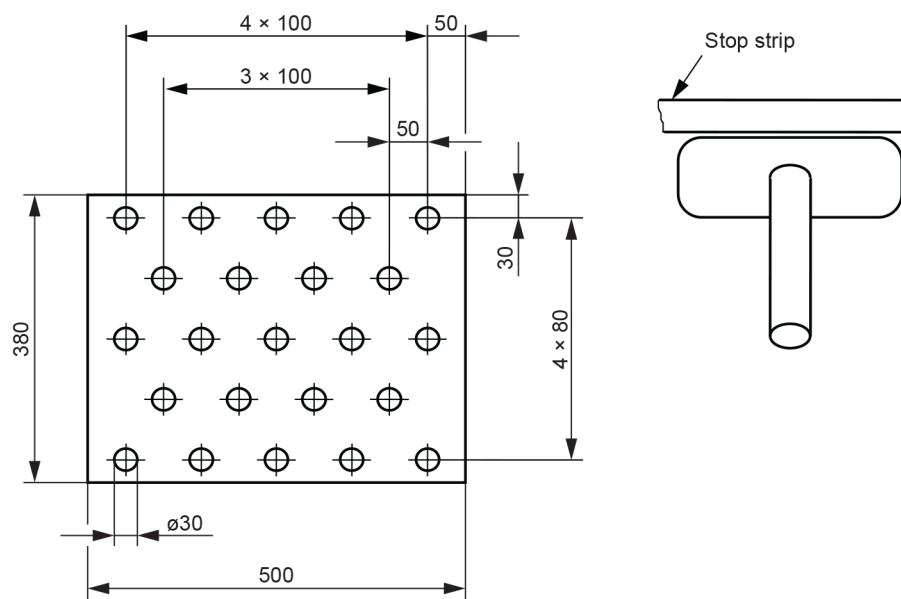
Figure 5 – Frame for test cushion

5.8.3 Distribution of fibres

For the distribution of fibres, a stencil, in accordance with Figure 6, shall be used. The stencil shall be 2 mm in thickness, have 23 holes of 30 mm diameter, and be free from burrs.

810

Dimensions millimetres



811

IEC

812

813

Figure 6 – Stencil for distribution of fibres on upholstery

814 The stencil shall be placed on the test cushion with its 500-mm long sides parallel to the 800-mm
 815 long sides of the cushion in such a way that the distance between the stop strip and the centre
 816 line of the nearest row of holes is equal to the **active depth of the cleaning head**.

817 (45 ± 1) mg of fibre material, in accordance with 7.2.3, shall be plucked by hand into 23
 818 approximately equal portions, which are then pressed lightly by the thumb, without rubbing or
 819 twisting, in the centres of the holes of the stencil.

820 **5.8.4 Determination of fibre removal ability from upholstery**

821 Prior to each **trial**, fibres sticking to the **cleaning head** shall be removed.

822 After removing the stencil, the **cleaning head** is passed once over the fibre-covered area in a
 823 zigzag pattern as shown in Figure 4 with the **forward strokes** at right angles to the stop strip.
 824 Remaining fibres may then be removed by carrying out **strokes** parallel to the stop strip not
 825 following a specific pattern. Fibres that have been pushed against the stop strip may be
 826 removed by **strokes** along the strip. The **stroke speed** shall be (0,5 ± 0,05) m/s and the
 827 **cleaning head** shall be in full contact with the test cushion during the cleaning. The final stop
 828 position is shown in Figure 4.

829 The number of **double strokes** (N_{STR}) required for full geometrical coverage of the test area is
 830 calculated as shown below:

$$831 \quad N_{STR} = W_T / B$$

832 Where:

833 N_{STR} is the number of **double strokes**, rounded up to the next integer;

834 W_T is the test width (0,5 m);

835 B is the **cleaning head width**, in m.

The cleaning time for fibre removal is the time needed for full geometric coverage of the test area plus the time needed for removal of the remaining fibres.

The time for full geometric coverage, t_c , in s, is calculated as follows:

$$t_c = N_{STR} \times \frac{L + \sqrt{B^2 + L^2}}{v_s}$$

Where:

L is the length, equal to the **active depth of the cleaning head** (m) + 0,38 m;

B is the **cleaning head width**, in m;

v_s is the **stroke speed**, in m/s.

The time to remove all fibres (judged visually by the operator from a standing position) shall be recorded. If the cleaning time exceeds 300 s, the cleaning is discontinued.

Three separate **trials** shall be carried out to establish a mean value of the fibre removal ability. The time to remove fibres sticking to the **cleaning head** shall not be taken into account.

5.9 Thread removal from carpets

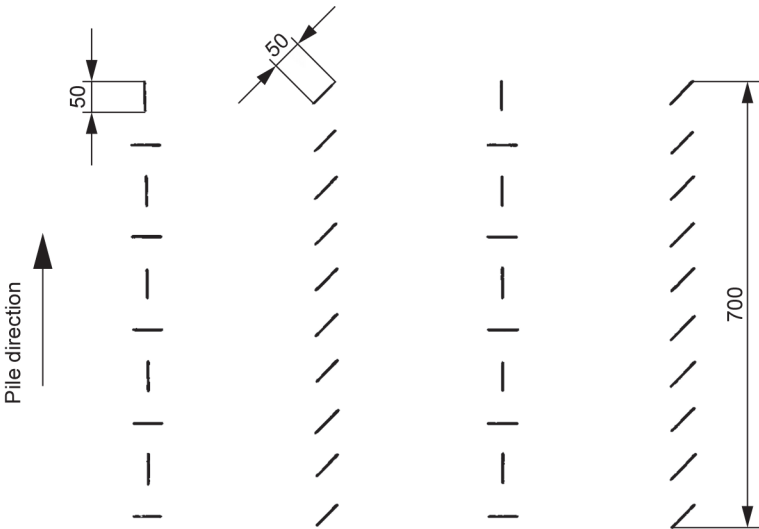
5.9.1 Test carpet

A Wilton test carpet in accordance with IEC TS 62885-1:, 4.1 shall be used.

5.9.2 Distribution of threads

Forty pieces of thread, that comply with 7.2.4, shall be arranged on the test carpet in four rows parallel with the pile direction according to the pattern shown in Figure 7. Each row shall have a length of 0,7 m and the distance between rows is adapted to the **cleaning head width**.

Dimensions in millimetres



IEC

Figure 7 – Arrangement of threads in the thread removal test

The threads are embedded into the carpet by carrying out three **double strokes** with a roller, that complies with 7.3.6.2, over each row and at a **stroke speed** of $(0,50 \pm 0,05)$ m/s.

5.9.3 Determination of thread removal ability

The **cleaning head** shall be adjusted for carpet cleaning and, if applicable, utilize such special arrangements that are provided to assist thread removal.

Prior to each **trial**, threads sticking to the **cleaning head** shall be removed.

During a **trial**, each row of threads is cleaned with one **double stroke** at a **stroke speed** of $(0,50 \pm 0,05)$ m/s, unless the **cleaning head** is a **self-propelled cleaning head**, the **stroke length** being in accordance with 5.1.2 (see Figure 8). The ratio of the number of threads removed from the carpet to the number of distributed threads is calculated and recorded.

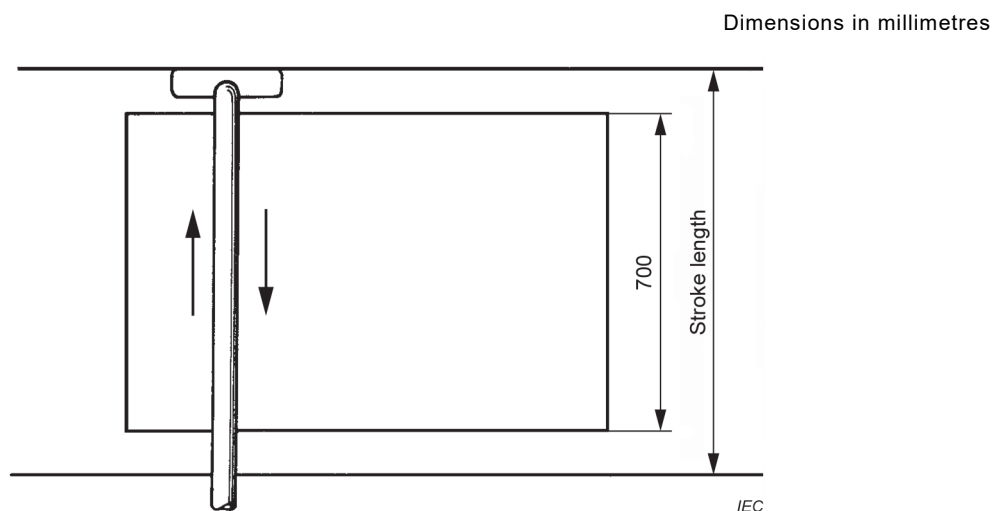


Figure 8 – Stroke length in tests

Three separate **trials** shall be carried out to establish a mean value of the thread removal ability, in per cent.

Threads sticking to the **cleaning head** are considered to be removed from the carpet. A suitable observation should be made in the test report.

5.10 Maximum usable volume of the dust receptacle

5.10.1 General

The purpose of this **test** is to determine the maximum usable volume of a dust receptacle. This **test** is not intended to include any clogging effects.

5.10.2 Conditions for test

The **dry vacuum cleaner** shall be equipped with a clean dust receptacle (see 4.5) and placed in its normal position of operation. **Upright vacuum cleaners** shall be tested in their vertical position.

Cylinder vacuum cleaners and **handheld vacuum cleaners** with the dust receptacle fill line oriented at an angle in the normal position of operation shall be rotated such that the fill line is orientated in a horizontal position prior to introducing the moulding granules. The vacuum cleaner shall remain in this orientation during the **test**. The vacuum cleaner shall not be moved or shaken during this test.