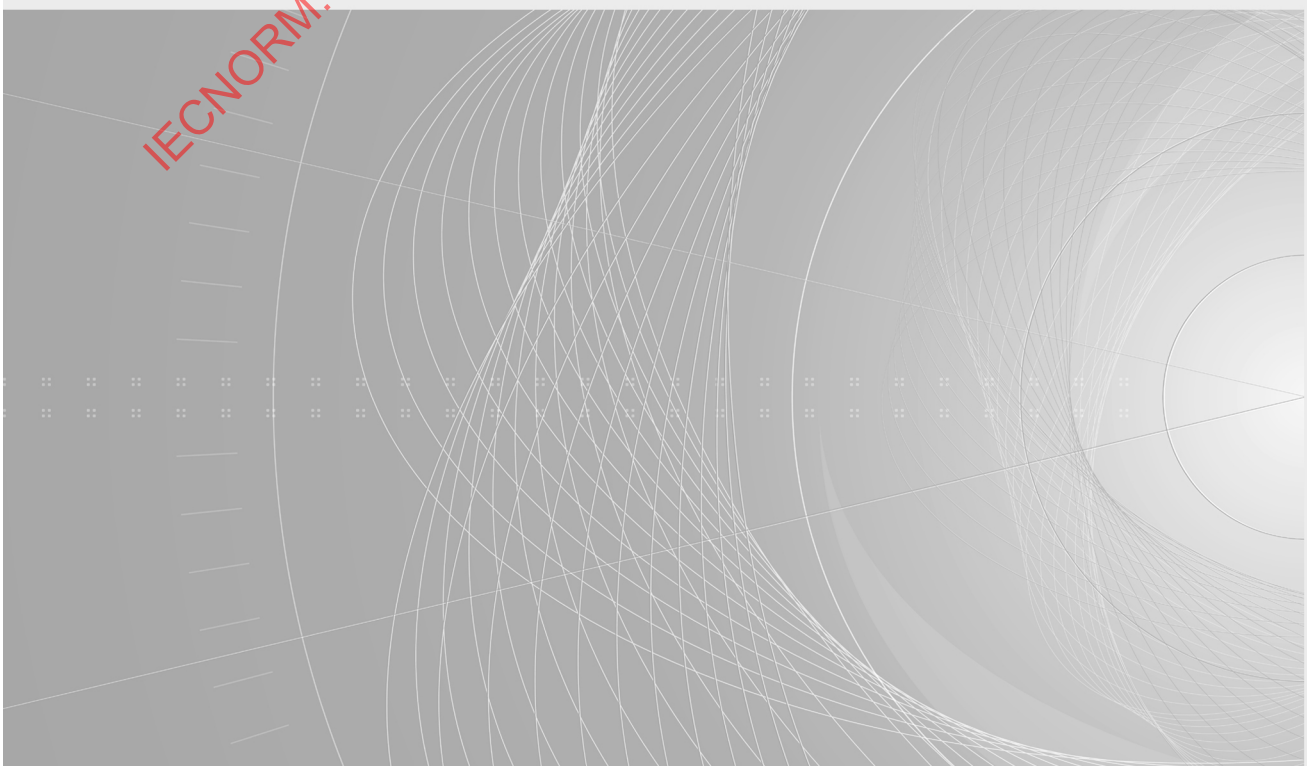
IEC TS 62885-1

Edition 3.0 2020-10

TECHNICAL SPECIFICATION

colour inside

Surface cleaning appliances –
Part 1: General requirements on test material and test equipment



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Surface cleaning appliances –
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SURFACE CLEANING APPLIANCES –

Part 1: General requirements on test material and test equipment

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62885-1, which is a technical specification, has been prepared by subcommittee 59F: Surface cleaning appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This third edition cancels and replaces the second edition published in 2016. This edition constitutes a technical revision.

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

a) Clauses 4 and 5 on test carpets have been combined into the new Clause 4;
b) a new Clause 5 has been added containing specifications and treatment of various kinds of test dust;
c) a level loop test carpet specification has been added.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
59F/390/DTS	59F/402/RVDTS

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

This document 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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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.

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 document using a colour printer.

INTRODUCTION

IEC subcommittee 59F has agreed to make a collection of test material and test equipment used in standards for testing surface cleaning appliances and to publish this collection as a technical specification. The existing annexes published on the IEC web will be integrated in this technical specification step by step.

Regular maintenance of the technical specification ensures that other standards which refer to this TS always reference the current status regarding test material and test equipment.

This third edition complements the specification of the Wilton test carpet in the second edition with the specification of a level loop test carpet and information on pre-treatment of test carpets.

Furthermore, the specification of various types of test dust has been included. Further test material and test equipment specifications will follow.

The intention with this document is to ensure a minimum of test material types and common use of these materials in tests of various surface cleaning appliances.

For information on supplies of test materials and details of test equipment, see Annex A.

Annex D provides general information relative to the various categories of dry vacuum cleaners.

SURFACE CLEANING APPLIANCES –

Part 1: General requirements on test material and test equipment

1 Scope

This part of IEC 62885 specifies the physical characteristics of test equipment and material used in tests common to several products covered by the IEC 62885 series for surface cleaning appliances. In addition, it provides guidance regarding the evaluation of Wilton and other types of carpets to determine their acceptability for testing and pre-treatment of test dust.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62885-2:–[1], *Surface cleaning appliances – Part 2: Dry vacuum cleaners for household or similar use – Methods for measuring the performance*

ISO 1763, *Textile floor coverings – 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 1833-1, *Textiles – Quantitative chemical analysis – General principles of testing*

ISO 2060, *Textiles – Yarn from packages – Determination of linear density (mass per unit length) by the skein method*

ISO 2061, *Textiles – Determination of twist in yarns – Direct counting method*

ISO 2424, *Textile floor coverings – Vocabulary*

ISO 4032, *Hexagon nuts (style 1) – Product grades A and B*

ISO 4766, *Slotted set screws with flat point*

ISO 6989, *Textile fibres – Determination of length and length distribution of staple fibres (by measurement of single fibres)*

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

ISO 13320, *Particle size analysis — Laser diffraction methods*

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1 Under preparation. Stage at the time of publication: IEC AFDIS 62885-2:2020.

BS 4223, *Methods for determination of constructional details of carpets with yarn pile*

BS 8459, *Determination of extractable matter in textiles – Method*

DIN 1587, *Hexagon domed cap nuts*

EN 1307, *Textile floor coverings – Classification*

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
interlaboratory testing
testing the same samples in different laboratories, with different operators, and comparing the results

4 Carpet construction specification

4.1 General

Test carpets shall be manufactured to the specifications provided in Table 1 and Table 2. Given that wool is a natural fibre, it should be understood that some variability exists in the final product.

The carpets used for performance testing of vacuum cleaners are classified and specified in accordance with the characteristics in Table 1 and Table 2.

The pile direction is predefined for tests on cut pile carpets (like the Wilton test carpet). Usually the pile direction of the test carpet is specified by the manufacturer. In Annex C several methods for determining pile direction are provided.

Table 1 – Wilton test carpet construction specifications

Type	Wilton	Tolerance	Test method/Standard
Pile composition	wool 8,6/2*2		
Yarn count	8,6/2*2		ISO 2060
Wool composition	80 % New Zealand – 20 % British		ISO 1833-1
Average fibre length	80/85 mm		ISO 6989
Spinning process	semi-worsted		
Spin rotations per metre	270		ISO 2061
Spin rotation direction	Z		ISO 2061
Ply twist coefficient	155		ISO 2061
Twisted rotation direction	S		ISO 2061
Moth protection treatment	0,1 % fermentol 12 %		
Colour dye (pigment)	metal complex dye: type Neolan		
Residual oil content	< 0,60		BS 8459
Method of manufacturing	Wilton fabric – Jackard weaving		ISO 2424
Colour	dark, one colour		ISO 2424
Backing	jute and cotton + latex		ISO 2424
Type	cut – pile		ISO 2424
Total thickness	9,2 mm	±5 %	ISO 1765
Thickness of pile above the substrate	6,6 mm	±5 %	ISO 1766
Total mass/m^2	2 300 g/m^2	±5 %	ISO 8543
Total mass of pile above the substrate/m^2 (effective pile not the total pile, determined on finished carpet)	1 260 g/m^2	±5 %	ISO 8543
Number of tufts/m^2	96 000 knots/m^2	±5 %	ISO 1763
Tuft density	96 knots/dm^2	±6 %	BS 4223
Reed	320 r/mots/dm		
Shots	300 sh/m		
Standard manufactured width	250 cm		
Latex – Specification	CTF2000 TEXCOAT M.BC 5 Polymer for pile anchorage		

Table 2 – Level loop test carpet construction specifications

Type	Woven level loop	Tolerance	Test method/Standard
Pile composition	wool 4,3		
Yarn count	4,2/3		ISO 2060
Yarn Blend	80/20 wool – PA6, (nylon)6		
Wool composition	50 % New Zealand – 50 % British		ISO 1833
Average fibre length	80 mm		ISO 6989
Spinning process	carded wool		
Spin rotations per metre	205		ISO 2061
Spin rotation direction	Z		ISO 2061
Ply twist coefficient	205		ISO 2061
Twisted rotation direction	S		ISO 2061
Moth protection treatment	0,1 % eulan		
Colour dye (pigment)	yellow chemacide E2GL, red alpacideLBG,blue alizarine		
Residual oil content	< 0,40%		BS 8459
Method of manufacturing	Jackard weaving		ISO 2424
Colour	dark, one colour		ISO 2424
Backing	jute and synthetic + latex		ISO 2424
Type	loop pile		ISO 2424
Total thickness	7,0 mm	± 5 %	ISO 1765
Thickness of pile above the substrate	4,7 mm	± 5 %	ISO 1766
Total mass/m^2	1 832 g/m^2 gcdt	± 5 %	ISO 8543
Total mass of pile above the substrate/m^2 (effective pile not the total pile, determined on finished carpet)	843 g/m^2 gecdt	± 5 %	ISO 8543
Number of tufts/m^2	105 805	± 5 %	ISO 1763
Tuft density	see number of knots	± 6 %	BS 4223
Reed	320		
Shots	320		
Standard manufactured width	68 cm		
Use class	XXX		EN 1307
Latex – Specification	TX 9262		

4.2 Construction verification

4.2.1 General

The new carpet shall meet the construction specifications provided in Table 1. and Table 2.

Annex B provides an example of an evaluation of the initial production run of the production lot BIC4 of the Wilton test carpet.

4.2.2 Performance verification

Additionally, interlaboratory testing shall be conducted to verify the measured performance values for the reference vacuum cleaner system RSB, with the passive nozzle and an active vacuum cleaner. A minimum of six laboratories shall test the same vacuum cleaners on samples of the new carpet and the previous carpet unique to each laboratory. Each carpet shall be tested in accordance with IEC 62885-2:–, 5.3 and 6.2 by each laboratory and the results of the two carpets shall be compared to determine differences between the old and new production runs as well as overall variability of the new production run.

4.3 Pre-treatment of new and replacement carpets for testing

4.3.1 General

New and replacement carpets shall be conditioned prior to conducting recordable testing upon them.

4.3.2 Pre-treatment of new Wilton test carpets for dust removal testing

Using a dry vacuum cleaner with a nozzle appropriate for the type of vacuum cleaners to be tested on the carpet, and with a dust removal ability of 75 % ± 5 % on Wilton test carpets for passive nozzles or 78 % ± 5 % on carpets for active nozzles, respectively, all loose fibre is removed by vacuuming the entire surface of the carpet for 5 min. Weigh the amount of fibre removed during this 5 min vacuuming period. If the amount of fibre removed is greater than 0,5 g, repeat the 5 min vacuuming and weighing procedures until less than 0,5 g is removed. Record the weight of the carpet.

After completing the fibre removal procedure, use an in-house reference vacuum cleaner with a dust removal ability of 75 % ± 5 % on carpets for passive nozzles or 78 % ± 5 % on Wilton test carpets for active nozzles, respectively, to conduct dust removal trials in accordance with IEC 62885-2:—, 5.3. A minimum of ten trials shall be conducted. After that, continue conducting trials until four consecutive trials vary by less than one percentage point (maximum minus minimum dust removal ability) for the Wilton test carpet and category C carpets, and 3 % for other carpets.

NOTE The category C carpet is described in IEC 62885-2.

It is important that the width of the nozzle used for preparing the carpet is bigger than the nozzles to be tested.

Separate carpets shall be used for active nozzles and passive nozzles. These separate carpets shall be clearly marked.

4.3.3 Verification of replacement carpets for dust removal testing

The in-house reference vacuum cleaner used for the pre-treatment of new carpets shall be used to verify the suitability of replacement carpets when required. If the deviation is greater than five percentage points in dust removal ability compared to an internally defined fixed target value, or to the original or first carpet used in the laboratory, then the new carpet shall not be used.

In any case, the carpet shall not be used for more than 600 cleaning cycles.

4.4 Pre-treatment of new carpets for the determination of airborne acoustical noise

A new carpet shall be conditioned prior to conducting recordable testing upon it.

Using a dry vacuum cleaner with a nozzle appropriate for the type of vacuum cleaners to be tested on the carpet, and with a dust removal ability of 75 % ± 5 % on Wilton test carpets for passive nozzles or 78 % ± 5 % on Wilton test carpets for active nozzles, respectively, all loose

fibre is removed by vacuuming the entire surface of the carpet for 5 min. Weigh the amount of fibre removed during this 5 min vacuuming period. If the amount of fibre removed is greater than 0,5 g, repeat the 5 min vacuuming and weighing procedures until less than 0,5 g is removed during 5 min. Record the weight of the carpet.

5 Standard test dusts

5.1 Simulated household dust

5.1.1 Background

In previous editions of standards for measuring the performance of dry vacuum cleaners, fine dust was used to simulate the filling of the dust receptacle during use. This was sufficient as long as a vast majority of vacuum cleaners was equipped with filter bags, often made of paper. In the nineties, more and more bagless vacuum cleaners came onto the market that claimed to experience no pressure drop when filling the dust container. The fine dust used for clogging bagged vacuum cleaners was not suitable for bagless appliances.

Therefore, it became necessary to establish a synthetic test dust that should correspond to the properties of real household dust with regard to morphology, dust propagation behaviour, dust bag pressure drop and degree of geometric capacity filling of dust receptacles (including wet-separating vacuum cleaner systems).

5.1.2 Composition of the simulated household dust

Based on a collection of dust receptacles from consumers, the properties of real household dust were determined as a starting position for the development of the synthetic test dust. After extensive testing it was found that a homogeneous mixture of

- 70 % by weight mineral dust type 3, in accordance with 5.1.3.1
- 20 % by weight cellulose dust in accordance with 5.1.3.2
- 10 % by weight second-cut cotton linters in accordance with 5.1.3.3

simulates real household dust for establishment of the filled dust receptacle condition best.

Figure 1 shows photographs under the microscope of real and simulated household dust. The good correspondence between the fibrous and non-fibrous components is easy to see. Figure 2 shows the simulated household dust ready for use.

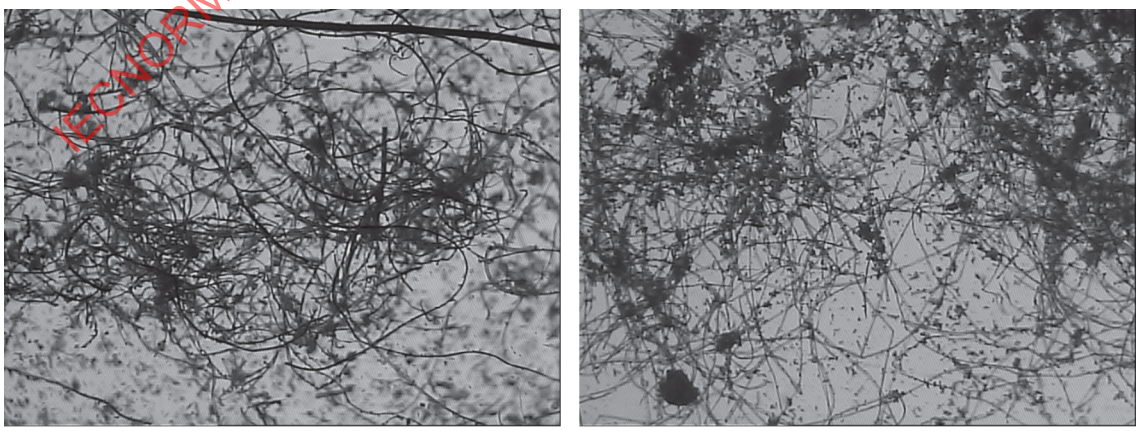

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Figure 1 – Real household dust (left) and simulated household dust (right)

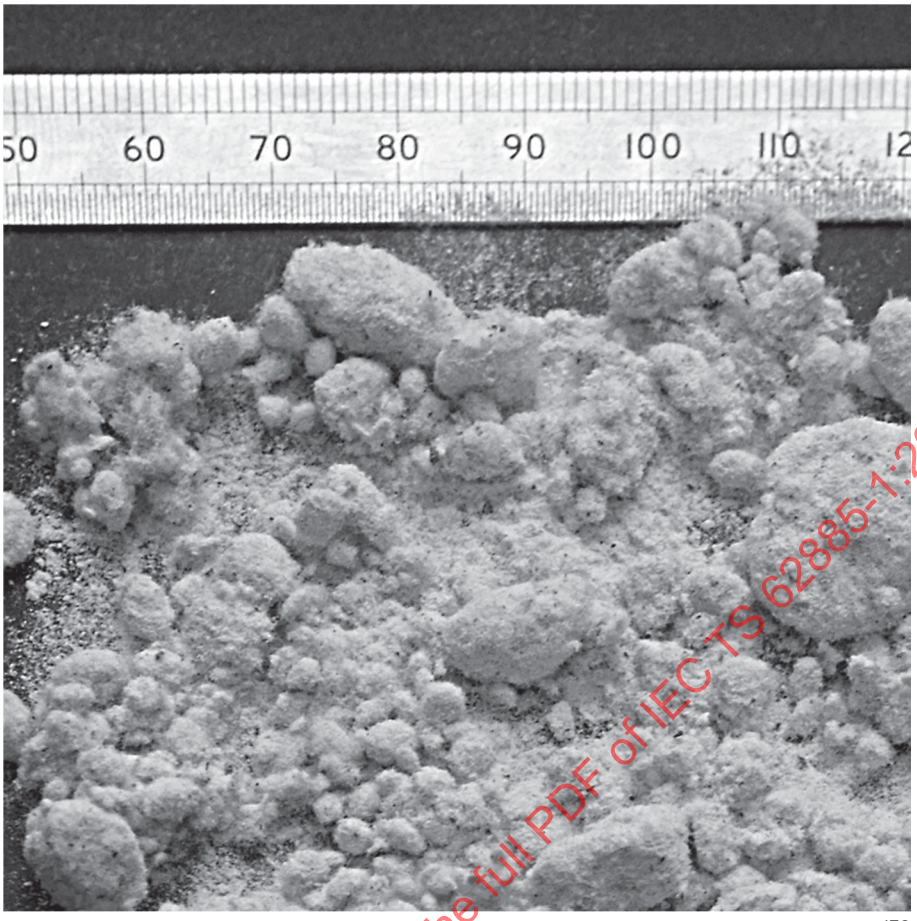

Figure 2 – Ready mixed simulated household dust

5.1.3 Components

5.1.3.1 Mineral dust – Type 3

The mineral dust Type 3 shall consist of dolomite sand with the typical particle size distribution specified in Table 3.

Table 3 – Grain size distribution: Type 3 mineral dust

Particle size (µm)	Q3 (volume per percent)
8	11 to 13
16	21 to 24
32	29 to 32
63	32 to 34
100	35 to 37
160	38 to 40
200	41 to 44
315	49 to 52
500	62 to 64
710	81 to 83
1000	98 to 100

5.1.3.2 Cellulose dust

The cellulose dust shall have the following composition and a fibre distribution in accordance with Table 4:

Type	highly pure cellulose
Characteristic	microfibre, white
Cellulose content	approximately 99,5 %
Average fibre length	30 µm
Average fibre thickness	18 µm
Bulk density	200 g/l to 260 g/l
Whiteness (absolute value at 461 nm)	(85 ± 5) %
Residue on ignition (850 °C; 4 h)	approximately 0,3 %
pH-value	6 ± 1

Table 4 – Cellulose dust fibre size distribution

Particle size (µm)	Q3 (volume per percent)
1	2 to 3
2	3 to 4
5	5 to 6
10	7 to 9
16	16 to 19
32	49 to 52
63	86 to 88
90	96 to 98
125	98 to 100

The analysis of the particle size distribution was performed with a laser diffractor, whose laser scattered light method according to ISO 13320 is calibrated and controlled with a certified reference material "BAM_D001" of BAM (Federal Institute for Materials Research and Testing, Germany).

5.1.3.3 Cotton linters

The cotton linters shall be cut with an upper length of 4 mm with the typical length range given in Table 5 in a linters screening mill. The fibre length (l) may be checked using a KajaaniFiberLab™[2] for example.

Table 5 – Cotton linters characteristics

Fibre length (l)-range mm	Average relative fibre quantity %	Deviation %
0 to < 0,2	0,75	±0,3
0,2 to < 0,5	6,25	±3
0,5 to < 1,2	22	±8
1,2 to < 2,0	25	±5
2,0 to < 3,2	22	±5
≥ 3,2	24	±8

5.1.4 Mixing of simulated household dust

5.1.4.1 General

The test dust may be prepared by adding to a mixing vessel the separate components, alternating in the following order: mineral dust, cellulose dust, cotton linters. The mixing vessel shall be part of the tumble mixer, which can be operated at $28\,^{+3}_{-0}$ rpm with a tilting angle of 15° for 5 min. The individual components as well as ready-mixed simulated household dust may be obtained from the supplier (see Annex A).

During transportation and storage of ready-mixed test dust, a partial separation or compaction of the material in the container will occur. Therefore, the supplier recommends the procedure for re-mixing in accordance with 5.1.4.2_Preparation_after_delivery.

5.1.4.2 Preparation after delivery

Irrespective of the package size, simulated household dust is usually packed in 2 kg containers. Vibrations and shocks during transport or delivery can cause the dust to segregate and become compressed. It is therefore necessary to return the dust to its original bulk density and homogenize it. For this purpose, a tumbler mixer is recommended that homogenizes the test dust for 3 min to 5 min at a speed of 28 rpm and at a tilting angle of 15°. A representative tumbler mixer is shown in Figure 3.

2 KajaaniFiberLab™ is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

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SOURCE: www.fuchsag.com.

Figure 3 – Tumbler mixer

5.1.4.3 Sampling of simulated household dust

To ensure that measurement results are reproducible with simulated household dust, the dust homogenized in accordance with 5.1.4.2_Preparation_after_delivery shall be evenly divided into smaller samples. A decisive parameter here is the bulk density. If, for example, 2 kg simulated household dust is divided into 50 g samples, it shall be ensured that all samples are divided with the same bulk density. The following steps are recommended for portioning.

1) Acclimatize simulated household dust by storing the container open for at least 24 h under test conditions.
2) Take 50 g of test dust using a measuring shovel.
3) Fill the test dust in a 100 ml beaker in which the bulk density can be monitored and weigh the 50 g portion. If the bulk density is correct, it can be used for testing
4) Now take the next sample at a different location from the simulated household dust container. Ideally, the sampling should be star-shaped (see the order 1 to 5 in Figure 4).

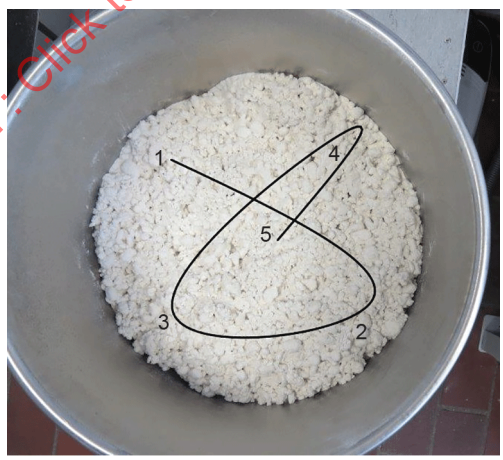

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Figure 4 – Order of sampling (star-shaped)

5) Check always the bulk density in a beaker.
6) If you find during filling that the bulk density cannot be maintained, return the test dust to the container and mix the test dust in the container using the measuring shovel. Now take a new sample.
7) Repeat steps 4) and 5).

5.1.4.4 Result of homogenously sampled simulated household dust

Figure 5 shows what the homogeneous division of the simulated household dust shall look like.

a) Homogenous sampling

b) Unbalanced sampling

Figure 5 – Sampling of simulated household dust

5.2 Mineral dust

5.2.1 Mineral dust – Type 1

The mineral dust type 1 shall consist of dolomite sand with the grain size distribution specified in Table 6.

Table 6 – Grain size distribution: Type 1 mineral dust

Particle size (µm)	Q3 (volume per percent)
8	9 to 11
16	21 to 24
32	34 to 36
63	37 to 40
100	41 to 43
160	45 to 48
200	50 to 53
315	58 to 61
500	67 to 71
710	83 to 85
1 000	97 to 98
2 000	99 to 100

5.2.2 Mineral dust – Type 2

The mineral dust type 2 shall consist of dolomite sand with the grain size distribution specified in Table 7.

Table 7 – Grain size distribution: Type 2 mineral dust

Particle size (µm)	Q3 (volume per percent)
90	2 to 4
125	14 to 16
180	59 to 60
250	94 to 96
315	99 to 100

5.3 Debris

5.3.1 Background

The previous standards for measuring the performance of vacuum cleaners did not contain a test for the pick-up of coarse material and debris. This was often criticised as a major shortcoming of the standards. Some years ago, consumer test organizations developed and successfully implemented their own tests for the pick-up of debris. But, often, organic goods such as rice and lentils are used.

In the meantime, standardization has also developed tests for determining the pick-up of coarse material for household vacuum cleaners. In general, test methods should be repeatable and reproducible. It is obvious that organic test materials such as rice and lentils have very large variations in shape and dimensions and are therefore not suitable for reproducible tests.

For this reason, standardization has set itself the task of replacing organic test materials with synthetic materials for which specifications or standards exist and which are widely available.

5.3.2 Medium size debris

Rice and lentils, as used by consumer testing organisations, were analysed for shape, weight and dimensions. On this basis, non-organic materials were searched for, which on the one hand represented rice and lentils as well as possible, but on the other hand were also specified and widely available.

The following standardised replacement materials were found to replace rice and lentils. Figure 6 illustrates the close match regarding shape, weight and dimensions between the identified non-organic materials, set screws and nuts, and rice and lentils, respectively. The corresponding specification is shown in Table 8.

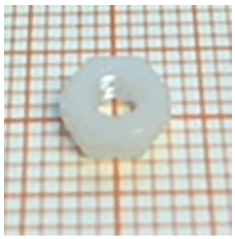
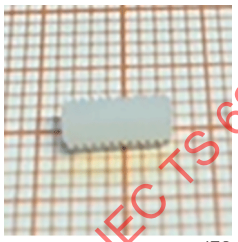
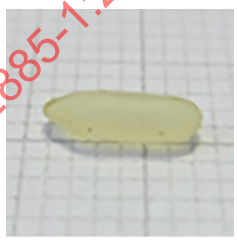
Medium	M3 nut PA 6,6 ISO 4032	Lentils	Set screw M3x6 PA 6,6 ISO 4766	Rice
	 IEC	 IEC	 IEC	 IEC
Shape	hexagon	round	elongated	elongated
Diameter	5,4 mm	5,8 mm	2,9 mm	1,8 mm
Height	2,5 mm	2,5 mm	6,3 mm	6,5 mm
Mass	0,051 g	0,049 g	0,036 g	0,017 g

Figure 6 – Comparison between non-organic and organic medium size debris

Table 8 – Specifications of nuts and set crews

Nuts	Set screws
Type: M3, hexagon regular nuts (style 1)	Type: M3x6 slotted set screws with flat point
Standard: ISO 4032	Standard: ISO 4766
Material: PA 6.6	Material: PA 6.6
Colour: natural	Colour: natural

5.3.3 Large debris

Typical coarse material on household floors is food such as chocolate-covered nuts and thick cookies or similar. Cap nuts as shown in Figure 7 are well suited to replace typical organic coarse material and represent non-organic material as large debris. The corresponding specification is shown in Table 9.

Hexagon domed cap nuts M4 PA 6.6

round head
6,9 mm
7,9 mm
0,205 g

IEC

figure

Shape	Round head
Diameter	6,9 mm
Heigth	7,9 mm
Mass	9,205 g

Figure 7 – Comparison between non-organic and organic large debris

Table 9 – Specification of cap nuts

Cap nuts
Type: M4, hexagon domed cap nuts, high type
Standard: DIN 1587
Material: PA 6.6
Colour: natural

Annex A
(informative)

Information on supplier of test materials and details of test equipment

Information on supplies of test materials and details of test equipment are available on the IEC website. This information can be accessed via SC 59F supporting documents on the IEC website:

www.iec.ch/sc59f/supportingdocuments.

This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the suppliers named.

This information will be continuously updated.

Annex B
(informative)

Initial production run of the BIC4 Wilton test carpet

Table B.1 shows the evaluation of the test results of BIC4 Wilton test carpets.

Table B.1 – Test results for BIC4 Wilton test carpets

Reference	Measured values
Construction	Woven, cut-pile Wilton
Material	Wool
Row	30,1 ± 0,1
Pitch	32,7 ± 0,2
Tuft density	985 dm^2± 7 dm^2
Total carpet weight	2 222 g/m^2± 97 g/m^2
Pile weight above substrate	1 249 g/m^2± 40 g/m^2
Total carpet thickness	8,8 mm ± 0,5 mm
Pile thickness above substrate	6,6 mm ± 0,4 mm
Surface pile density	0,185 g/cm^3± 0,003 g/cm^3
Oil content of pile	0,004 8% ± 0,000 8%

Annex C
(informative)

Determination of carpet pile direction

There are several methods for determining pile direction.

a) Pencil roll: Rotating a pencil on a paper lying on the pile surface will cause the paper to move in the direction of the pile (manufacturing).

b) Cylinder roll: Similar to pencil roll.

c) Oblique lighting: The colour appears lighter when looking in the pile direction, darker when looking in the direction opposite to the carpet pile.

d) Other.

Examples of oblique lighting are shown in Figure C.1 and Figure C.2.

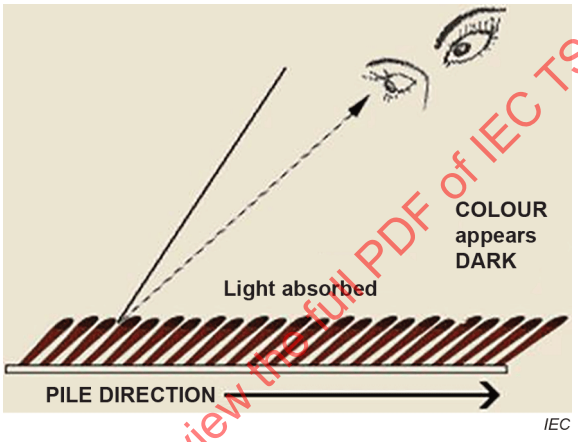


Figure C.1 – Looking against the pile direction

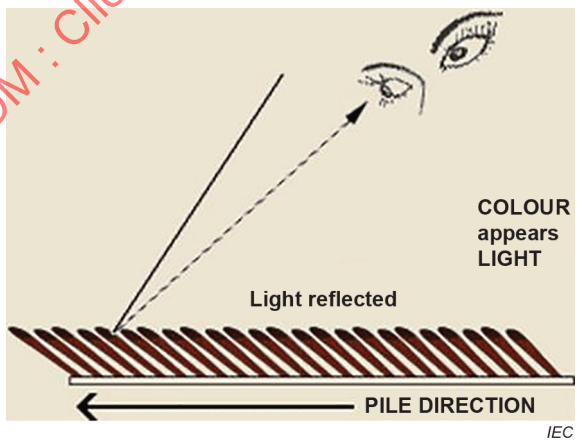


Figure C.2 – Looking with the pile direction

Each delivery of Wilton test carpet is accompanied by a certificate with information regarding at least the production lot and direction of manufacturing which is indicated by respective markings on the backing.