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2002

AMENDMENT 1
2004-11

Amendment 1

Household and similar electrical appliances – Safety –

Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for industrial and commercial use

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FOREWORD

This amendment has been prepared by subcommittee 61J: Electrical motor-operated cleaning appliances for industrial use, of IEC technical committee 61: Safety of household and similar electrical appliances.

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

FDIS	Report on voting
61J/169/FDIS	61J/172/RVD

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

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

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- withdrawn,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

CONTENTS

Add the titles of the new Annexes CC and DD as follows:

Add the titles of the following new figures:

Replace the title of Table AA.1 as follows:

FOREWORD

Add the following new item to the list of differences existing in some countries:

– 7.12: No requirements for sound marking exist (USA)

2 Normative references

Add the following new references:

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 61241-1-1, *Electrical apparatus for use in the presence of combustible dust – Part 1-1: Electrical apparatus protected by enclosures and surface temperature limitation – Specification for apparatus*

IEC 61241-10:2004, *Electrical apparatus for use in the presence of combustible dust – Part 10: Classification of areas where combustible dusts are or may be present*

ISO 2602, *Ergonomics – Danger signals for public and work areas – Auditory danger signals*

ISO 6344-2, *Coated abrasives – Grain size analysis – Part 2: Determination of grain size distribution of macrogrits P12 to P220*

ISO 7731, *Safety of machinery; Auditory danger signals; General requirements, design and testing*

ISO 11428, *Ergonomics – Visual danger signals – General requirements, design and testing*

3 Definitions

Add the following new definitions:

3.102
water-suction cleaning appliance
appliance for aspirating an aqueous solution that may contain foaming detergent

3.103
motorized cleaning head
accessory containing a motor that is supplied from the appliance and which is attached to the end of a hand-held hose or tube

NOTE The main cleaning head permanently attached is not regarded as a motorized cleaning head.

6 Classification

6.1 *Replace the existing second paragraph of this subclause with the following:*

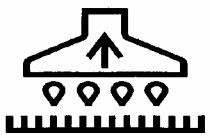
Metal parts that may continuously contact the body shall be considered as handles for which 22.36 applies.

7 Marking and instructions

7.1 *Delete this subclause.*

Add the following subclause:

7.6 *Addition:*



[symbol IEC 60417-5935 (DB:2000-10] motorized cleaning head for water-suction cleaning

7.12 *Replace the existing text of the addition by the following:*

The front cover of the instruction manual shall include the substance of the following:

CAUTION Read the instruction manual before using the appliance.

This wording may be replaced by symbols ISO 7000-0434A/B and ISO 7000-1641 (DB:2004:01). If these symbols are used, their meaning is to be explained in the instructions for use.

The instruction manual shall include the substance of the following warnings, as applicable.

– CAUTION This appliance is not suitable for picking up hazardous dust.

– CAUTION This appliance is for dry use only and is not to be used or stored outdoors in wet conditions.

– WARNING Only use the brushes provided with the appliance or those specified in the instruction manual. The use of other brushes may impair safety.

The instruction manual shall give details regarding the following, as applicable:

– the precautions to be taken when using the appliance under specific conditions such as handling flammable liquids or dust and dust hazardous to health;

– a statement that the appliance is to be disconnected from its power source during cleaning or maintenance, and that when replacing parts or converting the appliance to another function:

  - for mains operated appliances, the plug is to be removed from the socket-outlet;
  - for battery operated appliances, the key of the supply switch is to be removed or an equivalent disconnection is to be made;

– the intended use of brushes which are specified for the appliance.

The instruction manual shall state the A-weighted sound pressure level L_{PA} in dB(A) emitted by the appliance. If the A-weighted sound pressure level exceeds 85 dB(A), it shall also state the sound power level L_{WA} in dB(A) and that appropriate ear protection has to be used (the sound level is measured in accordance with IEC 60704-2-1).

The instruction manual shall include the substance of the following.

This appliance is suitable for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses.

The instruction manual for mains operated appliances shall include the substance of the following:

– do not allow the rotating brushes to come into contact with the supply cord;
– regularly examine the supply cord for damage, such as cracking or ageing. If damage is found, replace the cord before further use;
– only replace the supply cord with the type specified in the instruction manual;
– only use the socket outlet on the appliance for purposes specified in the instruction manual.

For wet suction appliances, the instruction manual shall state the substance of the following:

– CAUTION If foam or liquid escapes from the appliance, switch off immediately.
– regularly clean the water level limiting device in accordance with the instructions and examine it for signs of damage.

The instructions for appliances having a current-carrying hose operating at other than **safety extra-low voltage** shall include the substance of the following:

CAUTION: This hose contains electrical connections:
– do not use to collect water;
– do not immerse in water for cleaning;
– the hose should be checked regularly and shall not be used if damaged.

If symbol IEC 60417-5935 is used, its meaning shall be explained.

Add the following subclauses:

7.14 *Addition:*

The height of symbol IEC 60417-5935 shall be at least 15 mm.

Compliance is checked by measurement.

7.101 Motorized cleaning heads shall be marked with

– **rated voltage** or **rated voltage range** in volts;
– **rated power input** in watts;
– name, trade mark or identification mark of the manufacturer or responsible vendor;
– model or type reference.

Motorized cleaning heads for **water-suction cleaning appliances**, except those of **class III construction** having a **working voltage** up to 24 V shall be marked with symbol IEC 60417-5935.

NOTE This symbol is an information sign and, except for the colours, the rules of ISO 3864 apply.

Compliance is checked by inspection.

7.102 Appliance outlets for accessories shall be marked with the maximum load in watts.

NOTE This marking may be on the appliance close to the appliance outlet.

Compliance is checked by inspection.

10 Power input and current

Add the following subclause:

10.1 *Addition:*

The power input of **motorized cleaning heads** is measured separately.

15 Moisture resistance

15.2 *Replace the text after note 101 by the following:*

*Nozzles and **motorized cleaning heads** of **water-suction cleaning appliances** are placed in a container, the base of which is level with the surface supporting the appliance. The container is filled with a detergent solution to a level of 5 mm above its base, this level being maintained throughout the test.*

The solution consists of 20 g of NaCl and 1 ml of a solution of 28 % by mass of dodecyl sodium sulphate in each 8 l of water.

The appliance is operated until its liquid container is completely full and for a further 5 min.

NOTE 102 The solution should be stored in a cool atmosphere and used within seven days of its preparation.

NOTE 103 The chemical designation of dodecyl sodium sulphate is $C_{12}H_{25}NaSO_4$.

NOTE 104 If it is not possible to overfill the container for soiled liquid owing to the construction of the appliance, the test specified in 19.101 is considered to be adequate.

After each of these tests, the appliance shall withstand the electric strength test of 16.3.

*Inspection shall show that there is no trace of liquid on insulation that could result in a reduction of **clearances** or **creepage distances** below the values specified in Clause 29.*

NOTE 105 The appliance is allowed to stand in normal test room atmosphere for 24h before being subjected to the test of 15.3

Add the following subclause:

15.101 Motorized cleaning heads of **water suction cleaning appliances** shall be resistant to liquids that may come into contact with them.

Compliance is checked by the following tests.

*The **motorized cleaning head** is subjected to an impact test as described in IEC 60068-2-75, the value of the impact being 2 J. The **motorized cleaning head** is rigidly supported and three blows are applied to every point of the enclosure that is likely to be weak.*

It is then subjected to the free fall test procedure 1 of IEC 60068-2-32. It is dropped 4 000 times from a height of 100 mm onto a steel plate having a thickness of not less than 15 mm. It is dropped

– *1000 times on its right side;*
– *1000 times on its left side;*
– *1000 times on its front face;*
– *1000 times on its cleaning surface.*

*The **motorized cleaning head** is then subjected to the test described in 14.2.7 of IEC 60529, the water containing approximately 1 % NaCl.*

*The **motorized cleaning head** shall then withstand the electric strength test of 16.3, the voltage being applied between the **live parts** and the solution, and inspection shall show that there is no trace of saline solution on insulation which could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

NOTE The test is not carried out on **motorized cleaning heads** of **class III construction** having a **working voltage** up to 24 V.

16 Leakage current and electric strength

Add the following subclause:

16.3 *Addition:*

Current-carrying hoses, except for their electrical connections, are immersed for 1 h in water containing approximately 1 % NaCl, at a temperature of 20 °C ± 5 °C. While the hose is still immersed, a voltage of 2 000 V is applied for 5 min between each conductor and all the other conductors connected together. A voltage of 3 000 V is then applied for 1 min between all the conductors and the saline solution.

19 Abnormal operation

19.1 *Add the following new paragraph:*

*The test of 19.7 is only carried out on **motorized cleaning heads**.*

19.7 *Replace the existing text with the following:*

***Motorized cleaning heads** are tested with the rotating brush or similar device locked for 30 s.*

20 Stability and mechanical hazards

Add the following subclauses:

20.1 *Addition:*

NOTE 101 **Motorized cleaning heads** are not subjected to this test.

20.101 Shaft ends and similar rotating parts shall be protected if they protrude by more than a quarter of their diameter, unless the end is rounded and less than 50 mm in length.

Injury due to unintentional closing or slamming of parts, such as movable side walls and covers, shall be prevented.

Wheels or rollers for the transport of appliances heavier than 20 kg shall be located or protected so that injury to the feet of the operator is prevented.

Compliance is checked by inspection, by measurement and by manual test.

21 Mechanical strength

Add the following new subclauses:

21.102 Current-carrying hoses shall be resistant to crushing.

Compliance is checked by the following test.

The hose is placed between two parallel steel plates each having a length of 100 mm, a width of 50 mm and the edges of the longer sides rounded with a radius of 1 mm. The axis of the hose is positioned at right angles to the longer sides of the plates. The plates are placed at a distance of approximately 350 mm from one end of the hose.

The steel plates are pressed together at a rate of 50 mm/min ± 5 mm/min until the applied force is 1,5 kN. The force is then released and the electric strength test of 16.3 is carried out between the conductors connected together and the saline solution.

21.103 Current-carrying hoses shall be resistant to abrasion.

Compliance is checked by the following test.

One end of the hose is attached to the connecting rod of the crank mechanism shown in Figure 102. The crank rotates at 30 revolutions per minute resulting in the end of the hose moving horizontally backwards and forwards over a distance of 300 mm.

The hose is supported by a rotating smooth roller over which a belt of abrasive cloth moves at a speed of 0,1 m/min. The abrasive is corundum grit size P 100, as specified in ISO 6344-2.

A mass of 1 kg is suspended from the other end of the hose, which is guided to avoid rotation.

In the lowest position, the mass has a maximum distance of 600 mm from the centre of the roller.

The test is carried out for 100 revolutions of the crank.

*After the test, **basic insulation** shall not be exposed and the electric strength test of 16.3 is carried out between the conductors connected together and the saline solution.*

21.104 Current-carrying hoses shall be resistant to flexing.

Compliance is checked by the following test.

*The end of the hose intended to be connected to the **motorized cleaning head** is attached to the pivoting arm of the test equipment shown in Figure 103. The distance between the pivot axis of the arm and the point where the hose enters the rigid part is 300 mm ± 5 mm. The arm can be raised from the horizontal position by an angle of 40° ± 1°. A mass of 5 kg is suspended from the other end of the hose or from a convenient point along the hose so that when the arm is in the horizontal position the mass is supported and there is no tension on the hose.*

NOTE 1 It may be necessary to reposition the mass during the test.

The mass slides against an inclined plate so that the maximum deflection of the hose is 3°.

The arm is raised and lowered by means of a crank that rotates at a speed of 10 ± 1 r/min.

The test is carried out for 2 500 revolutions of the crank after which the fixed end of the hose is turned through 90° and the test continued for a further 2 500 revolutions. The test is repeated in each of the other two 90° positions.

NOTE 2 If the hose ruptures before 10 000 revolutions of the crank, the flexing is terminated.

After the test, the hose shall withstand the electric strength test of 16.3.

21.105 Current-carrying hoses shall be resistant to torsion.

Compliance is checked by the following test.

One end of the hose is held in a horizontal position with the remainder of the hose freely suspended. The free end is rotated in cycles, each cycle consisting of five turns in one direction and five turns in the opposite direction, at a rate of 10 turns per minute.

The test is carried out for 2 000 cycles.

After the test, the hose shall withstand the electric strength test of 16.3 and shall not be damaged to such an extent that compliance with this standard is impaired.

21.106 Current-carrying hoses shall be resistant to cold conditions.

Compliance is checked by the following test.

A 600 mm length of hose is bent as shown in Figure 104 and the ends are tied together over a length of 25 mm. The hose is then placed for 2 h in a cabinet having a temperature of –15 °C ± 2 °C. Immediately after the hose is removed from the cabinet it is flexed three times, as shown in Figure 104, at a rate of one flexing per second.

The test is carried out three times.

There shall be no cracks or breaks in the hose and it shall withstand the electric strength test of 16.3.

NOTE Any discoloration is neglected.

24 Components

Add the following subclause:

24.2 *Addition:*

For appliances worn on the body in normal use, a remote switching device may be located at the end of an **interconnecting cord**, when the switching device cannot come into contact with the floor when the appliance is worn on the user.

The strain relieves on both sides of the **interconnecting cord** shall comply with 25.15.

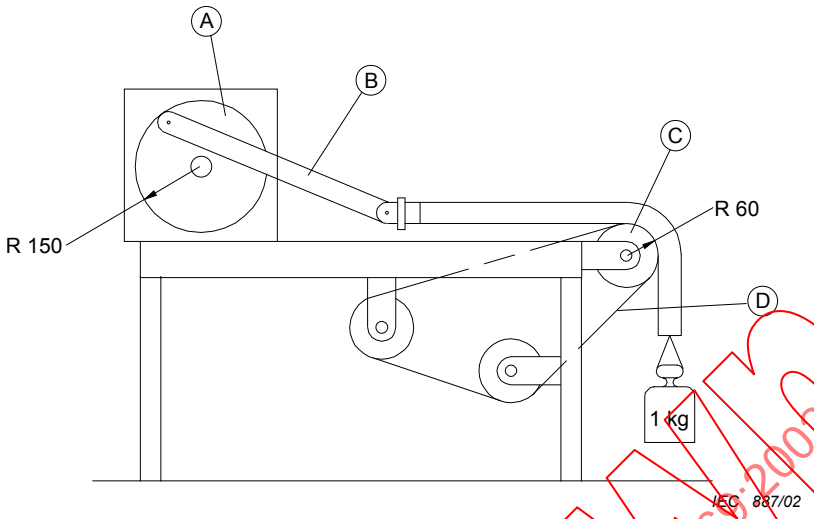
25 Supply connection and external flexible cords

Add the following subclause:

25.23 *Addition:*

NOTE 101 There is no limitation on the length of conductors in flexible hoses.

Dimensions in millimetres

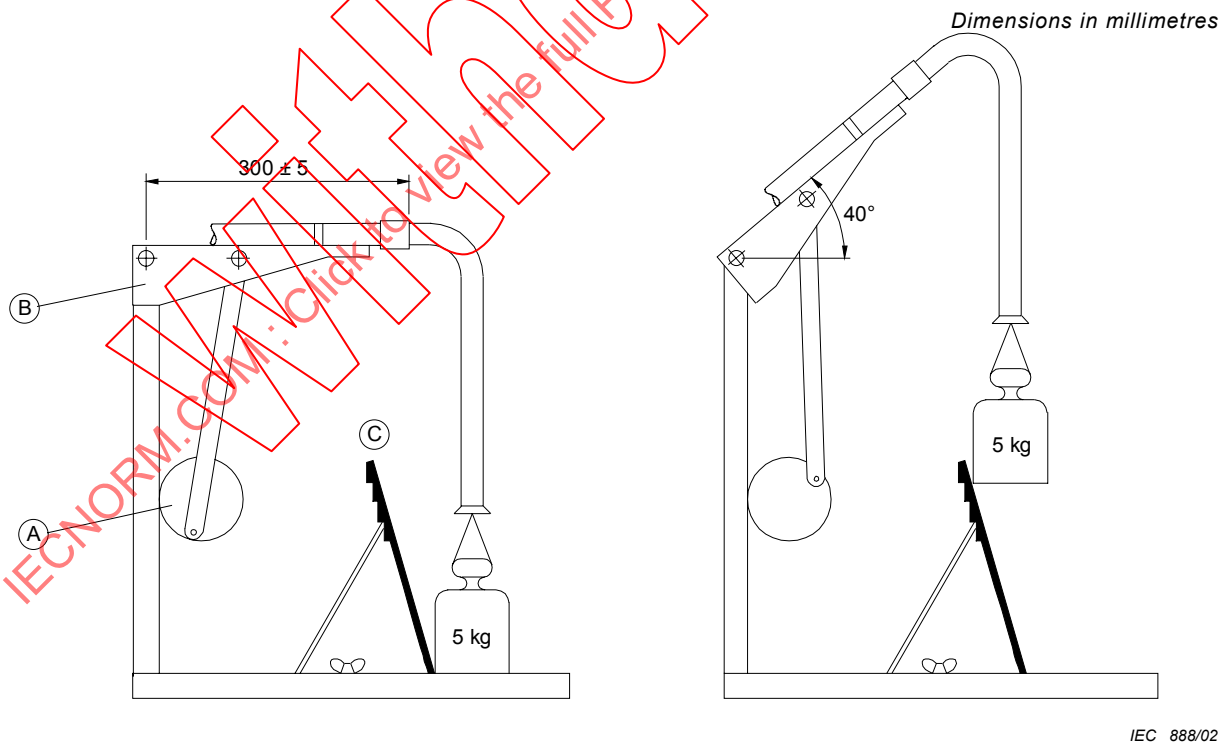


Key

A Crank mechanism
B Connecting rod
C Roller, diameter 120 mm
D Abrasive cloth belt

Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses

Dimensions in millimetres

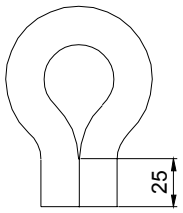


Key

A Crank mechanism
B Arm
C Inclined plane

Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses

Dimensions in millimetres



IEC 889/02

Figure 104 – Configuration of the hose for the freezing treatment

IEC 890/02

Figure 105 – Flexing positions for the hose after removal from the freezing cabinet

Annexes

Add the following annex:

Annex A
(normative)

Routine tests

NOTE 101 For the purposes of this standard, this annex of Part 1 is considered normative.

A.3 *Addition:*

For appliances of **dust class H**, compliance with the penetration requirement of Table AA.1 has to be shown either for the complete appliance or for the essential filter element.

Annex AA

Add to all of the existing clause and subclause numbers of this annex the prefix "AA."

NOTE The clause and subclause numbering applied in the following instructions makes reference to the original numbering of the annex after the above instruction is applied.

AA.3 Definitions

Replace the existing definition 3.203 as follows:

AA.3.203
penetration D
degree of penetration of a filter material, a filter or an appliance, determined as follows:

$$D = \frac{\dot{m}_{out}}{\dot{m}_{in}} \times 100\ \%$$

where

$\dot{m}_{out}$ is the average mass concentration of the test aerosol in the downstream air during the sampling time

$\dot{m}_{in}$ is the average mass concentration of the test aerosol in the upstream air during the sampling time

AA.7 Marking and instructions

AA7.12 *Addition:*

Add the following dashed item:

– max. flow rate (m³/h) and max. underpressure (hPa);

Replace the last sentence of the 6th dashed item by:

In addition, on class **H** appliances, the appliance filtration efficiency should be tested at least annually, or more frequently as may be specified by national requirements. The test method that can be used to verify the appliance's filter efficiency are specified in AA.22.201.2. If the test fails, it shall be repeated with a new essential filter;

AA.7.14 *Addition:*

Amend the first sentence of the addition to read:

Class L, M and H appliances shall be fitted with the relevant label according to Figure AA.1.

AA.19 Abnormal operation

AA.19.201 *Amend the second paragraph to read as follows:*

Compliance is checked by inspection and the test of AA.22.201.4.

AA.22 Construction

AA.22.201

Replace Table AA.1 with the following table:

Table AA.1 – Penetration limits

Dust class	Suitability for hazardous dust with limit values for occupational exposure mg x m^{-3}	Degree of penetration D %	Essential filter material test [a)]	Essential filter element test [a)]	Assembled appliance test method
L (light hazard)	> 1	< 1	AA.22.201.1 or AA.22.201.2	Not required	AA.22.201.3 if essential filter material test is not carried out
M (medium hazard)	≥ 0,1	< 0,1	AA.22.201.1 or AA.22.201.2	Not required	AA.22.201.3
H (high hazard)	<0,1 , including carcinogenic dusts and dusts contaminated with carcinogens and/or pathogens	< 0,005	Not required	AA.22.201.2	AA.22.201.3
NOTE Appliances using an identical construction of essential filter and mounting and with an identical airflow velocity can be approved by testing one model in the range.					
[a)] These tests may be conducted by the filter/material manufacturer.					

Add after Table AA.1 the following new note:

NOTE Appliances of dust class M are suitable for wood dust.

Delete the penultimate sentence.

Replace the last sentence by the following:

Compliance is checked by the following tests:

Add the following new subclauses:

AA.22.201.1 Essential filter material test

*For **dust class L** and **M** appliances the degree of penetration of the filter material is determined as follows:*

Compliance is tested using apparatus similar to Figure AA.2. An integrally measuring photometer or a suitable particle measuring system can be used. The test is carried out using 6 new material samples.

The dust laden air is sucked through the filter material for one hour, the air flow velocity at the measuring point P being the same as the air flow velocity at the filter in the appliance.

The test dust used is a wide spectrum quartz dust in a concentration of (200 ± 20 mg/m³) , where 90 % of the particle diameters at the measuring point P are between 0,2 µm and 2 µm, based on Stokes diameter [1].

The degree of penetration is calculated by means of the following formula:

$$D = \frac{C_H - C_o}{C_v - C_o} \times 100\ \% \qquad (1)$$

where

C_H = *the light-scattering signal downstream of the filter;*

C_O = *the blank value of the apparatus for ambient air;*

C_V = *the light scattering signal upstream of the filter.*

The degree of penetration is averaged over the duration of the test, the first readings being taken 5 min after the commencement of the flow of dust laden air through the filter sample material.

The degree of penetration D is determined for 6 samples.

The arithmetic mean of the 6 values, plus twice the standard deviation, shall be less than the required value of D according to Table AA.1.

1 Information on supply sources can be found on the IEC website, dashboard SC61J.

AA.22.201.2 Essential filter element test.

*For **dust class H** appliances the degree of penetration of the **essential filter** element shall be determined as follows:*

Compliance is checked by using apparatus similar to Figure AA.4.

On appliances with a ducted outlet Figure AA.3 can be used.

*All dust filters are removed, except the **essential filter** element.*

*It shall be ensured that the **essential filter** element is evenly loaded with the test aerosol.*

*The test is carried out with a new **essential filter element.***

The test aerosol is a narrow spectrum mist of paraffin oil, dispersed oil particulate (DOP) or NaCl, in a concentration between 10 mg/m³ and 100 mg/m³.

According to Stokes diameter, 90 % of the number of particles are below 1 µm.

An integrally functioning photometer or a suitable particle counter is used to measure D continually.

NOTE The effect of carbon brush dust shall be taken into consideration.

After the first 5 min adjustments may be made if necessary. After a second delay of 20 min D is calculated with equation [1].

D is not allowed to exceed the limit value given in Table AA.1.

AA.22.201.3 Assembled appliance test.

*For **dust class M and H** appliances a polydisperse limestone dust of particle size distribution 10 % < 1 µm, 22 % < 2 µm, 75 % < 5 µm is used [2] for testing, in an apparatus similar to Figure AA.4.*

After a minimum of 3 cycles, when the airflow velocity has fallen to 20 m/s in the nominal suction hose diameter, with a maximum measuring time of 8 h, D is determined, either gravimetrically with a 95 % one-sided confidence level according to ISO 2602, or with an equivalent measuring system.

If the fan of the vacuum cleaner under test is strong enough to maintain the required airflow rate, Q_E may be reduced to zero.

The upstream concentration of the test substance during the entire test shall be 5 g/m³ airflow.

D shall not exceed the values given in Table AA.1.

NOTE A test for suction sweeping machines is under consideration. The influence of air temperature, humidity and density shall be taken into consideration.

After this test, a further test shall be carried out according to AA.22.201.2.

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[2] Information on supply sources can be found on the IEC website, dashboard SC61J.

AA.22.201.4 Burst strength test

*For **dust classes L, M and H**, a clogging medium (e.g. French chalk) is used to give 90 % of the maximum differential pressure obtained by the method used when measuring P_i in 3.1.9, and a pulsing effect is achieved by covering the inlet to the machine for 5 s followed by opening for 1 s.*

NOTE Any parts, with the exception of the essential filter itself, may be dried to facilitate the flow of the clogging medium. All collection bags and pre-filters shall be removed from the appliance to ensure that the essential filter is subjected to the full loading of the clogging media and the pulsing effect of blocking the inlet as described.

The pulsing test shall be repeated 30 times over a period of 3 min.

*Fracture or break-down of the **essential filter** shall not occur. If a safety switch is fitted to protect the motor and filter system, it is rendered inoperable.*

AA.22.202 *Replace the existing text of the subclause by the following:*

AA.22.202 All dust removal appliances shall be capable of achieving an adequate removal of dust, and an indication shall be given as follows.

a) Vacuum cleaners of dust class **M** and **H** shall be provided with an indicator which operates before the air velocity, through the largest hose (or tube) supplied by the manufacturer, falls below 20 m/s, referring to the largest section in the hose. If airflow indicator adjustments are necessary, they shall be adjustable without **tools.**

b) For suction-sweeping appliances, the indicator shall operate before the reduction of pressure in the suction region of the brush area becomes less than 50 N/m^2 . This also applies to the side brush area.

c) For dust extractors (excluding negative pressure units and excluding appliances of dust class **L**) the indicator shall operate before the suction velocity becomes less than as stated by the manufacturer or 20 m/s, whichever is greater, referring to the largest section in the hose, or the dust source is shut off by a mechanism in the dust collector. If airflow indicator adjustments are necessary, they shall be adjustable without tools. If the dust source cannot be shut off (e.g. when there is a conveyer belt system in a production process), then at least one of the following warning signals shall be given:

   – an acoustic warning signal, if used, shall comply with ISO 7731;

   – a visual warning signal, if used, shall comply with ISO 11428;

   – a pair of voltage-free contacts and installation instructions for their use as a warning signal switching device.

Compliance is checked by inspection and the following test.

Operate the appliance in accordance with the instructions for use, at nominal voltage, at rated voltage +6 %, and at rated voltage –10 %; and, if necessary, compare the values with the specified values. No leaking of dust shall occur.

AA.22.203 *Replace, in the first paragraph of the test specification,* the word ”*conducting*“ *by* “*carrying out*“.

AA.22.208 *Delete this subclause and renumber the subsequent subclauses accordingly.*

Replace Figure AA.1 with the following:

Dimensions in millimetres (± 0,5 mm)

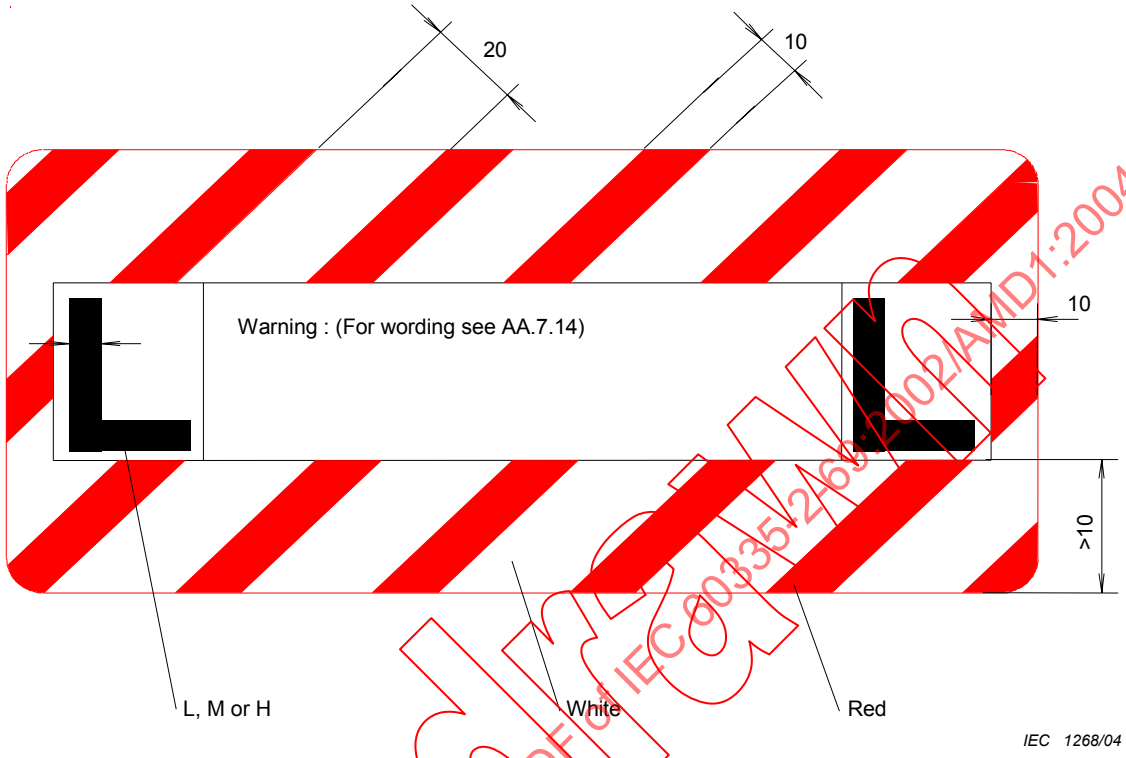


Figure AA.1 – Warning label

Add the following Figures AA.2, AA.3 and AA4:

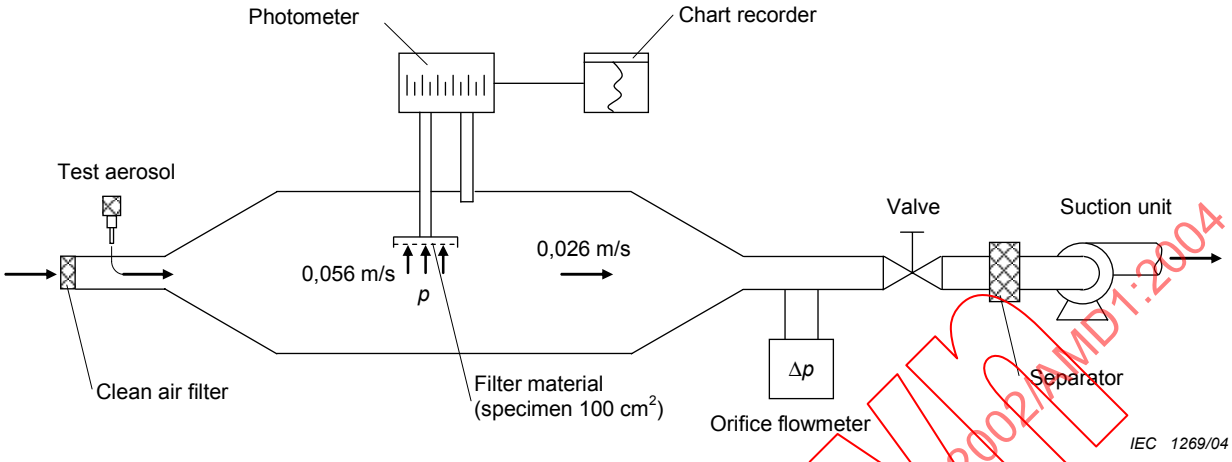


Figure AA.2 – Test method for essential filter material

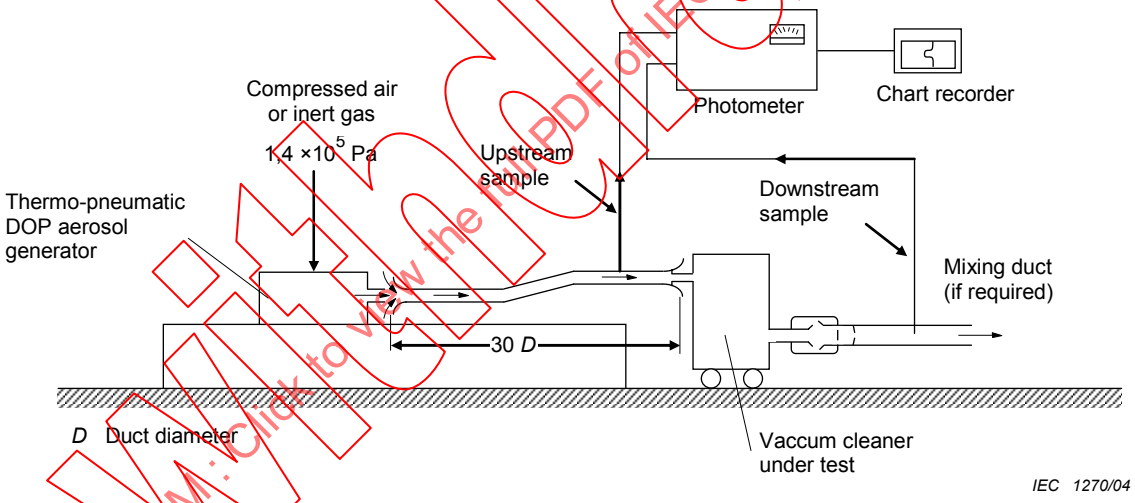
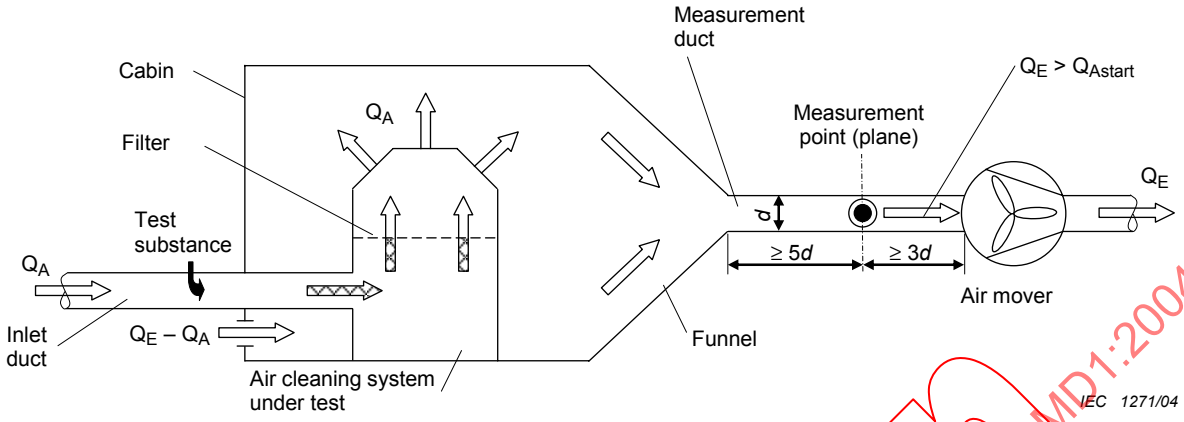


Figure AA.3 – *In situ* essential filter element test



NOTE The air entering at Q_E should be filtered. The filter used shall be of dust class M.

Figure AA.4 – Assembled appliance test

Add the following new annexes:

Annex CC
(normative)

Particular requirements for vacuum cleaners, suction sweeping machines and dust extractors for the collection of dusts which are an explosion risk

The following modifications to the relevant clauses in this part 2 are applicable to vacuum cleaners, suction sweeping machines and dust extractors for the collection of dusts which present an explosion risk.

NOTE In this annex, subclauses that are numbered starting from 201 are additional to those in this part 2.

CC.1 Scope

This clause of this part 2 is applicable except as follows.:

Addition:

This standard applies to non-fixed motor-operated vacuum cleaners, suction sweeping appliances and dust extractors specifically designed for wet and/or dry suction for industrial and commercial use and specifies additional requirements for collecting **combustible dusts** in **zone 22**.

CC.3 Definitions

This clause of this part 2 is applicable except as follows:

Addition:

CC.3.201
combustible dust
dust with a particle size below 1 mm, able to undergo an exothermic reaction with air when ignited

CC.3.202
type 22 appliance
vacuum cleaner, suction sweeping machine or dust extractor suitable for suction of combustible dust in **Zone 22**. The inner part of the appliance where the dust is collected is considered to be **Zone 20**

NOTE The inner part of suction hoses and nozzles are considered to be Zone 22.

CC.3.203
Zone 20
See 6.2 of IEC 61241-10.

CC.3.204
Zone 22
See 6.2 of IEC 61241-10.

CC.3.205
electrostatic earthing
connection to earth with a maximum resistance of 1 MΩ

CC.3.206
conductive parts
parts made of materials with a specific resistance of not more than 10 000 Ω.m.

CC.4 General requirement

This clause of this part 2 is applicable except as follows:

Addition:

CC.4.201

Appliances of **Type 22** shall comply with dust class **L**, **M** or **H** according to Annex AA. For dust class **L**, there is an indicator required in accordance with AA.22.202. For all appliances, flow-through collector motors are not allowed.

CC.4.202

The temperature of the surfaces of a **Type 22** appliance that are in contact with **combustible dust** shall not exceed 135 °C.

NOTE Lower temperatures can be stated by the manufacturer.

Compliance is checked by the tests of Clauses 11 and 19.

CC.6 Classification

This clause of this part 2 is applicable except as follows:

CC.6.1 *Addition:*

Type 22 appliances shall be of Class I.

CC.6.2 *Addition:*

Type 22 appliances shall be at least IP54 according to IEC 60529.

NOTE 1 The test is carried out with air-moving fans working.

NOTE 2 Data lead connectors are not required to be IP54 if they are SELV and their current is limited to 20 mA.

Compliance is checked by the appropriate tests

CC.6.201 The appliances are classified as follows:

– **Type 1**: Appliances that are suitable for operation in **Zone 22.**

CC.7 Marking and instructions

This clause of this part 2 is applicable except as follows:

CC.7.1 *Addition:*

Type 22 vacuum cleaners and suction sweeping machines shall be clearly and permanently marked with the substance of the following wording:

– Do not pick up glowing dust or other ignition hazards.

– **Type 22:** Suitable for picking up combustible dust in Zone 22.

Type 22 dust extractors shall be clearly and permanently marked with the substance of the following wording:

– Do not pick up glowing dust or other ignition hazards.

– Do not use for spark generating machines.

– **Type 22**: Suitable for the suction of **combustible dust** in **Zone 22.**

The warning text shall be placed within a yellow warning triangle with a black border according to Figures CC.1 and CC.2.

Appliances shall be marked in accordance with IEC 61241-1-1, for example "Ex II 3D T135°C".

Appliance inlets shall be marked with the essence of the statement: "Do not plug or unplug under load."

CC.7.12 *Addition:*

The instructions for use shall include the substance of the following.

For all **Type 22** appliances:

– The dust container has to be emptied when necessary, but also after every use;

– extension cords shall not be used;

– the correct rotation sense shall be ensured if necessary, to avoid blowing and high temperatures caused by rotation in the wrong sense.

– "For dusts with an ignition energy less than 1mJ additional restrictions of the labour authorities may apply."

Note Typical values for ignition energy can be found in Annex BB.

– "During normal operation surface temperatures may rise to (T_{max}) °C", if T_{max} exceeds 80 °C.

– "**Type 22** appliances are not suitable to pick up dusts or liquids of high explosion risk, nor mixtures of **combustible dust** with liquids."

– "WARNING – Only use accessories approved by the manufacturer for **Type 22** use. The use of other accessories may cause explosion hazard."

– "The appliance shall only be operated when all filters, including filters for motor cooling air, are in position and undamaged."

For suction sweeping machines:

– **Type 22** suction sweeping machines are suitable for picking up **combustible dust** in **Zone 22**.

For vacuum cleaners:

– **Type 22** vacuum cleaners are suitable for picking up **combustible dust** in **Zone 22**. They are not suitable to be connected with dust-generating machines.

For dust extractors:

– **Type 22** dust extractors are suitable to be connected to dust-generating machines in **Zone 22**. It has to be ensured that no ignition sources will be picked up**. Conductive machine parts**, including suction hoods and **conductive parts** of Class II machines, shall be **electrostatically earthed**. **Electrostatic earthing** can be accomplished through the dust extractor or through a separate **electrostatic earthing** means.

– **Type 1** dust extractors are not suitable for machines where ignition sources are produced.

Information shall be given about the national regulations that apply for the installation of data lead wiring and power sockets in **Zone 22**.

CC.11 Heating

This clause of this part 2 is applicable except as follows:

Addition:

Table 3 – Maximum normal temperature rises

Addition:

NOTE 101 For parts that come into contact with combustible dust, the values in the table are based on an ambient temperature of 40 °C.

CC.19 Abnormal operation

This clause of this part 2 is applicable except as follows:

CC.19.7 *Addition:*

Delete Note 101 of this part 2.

Addition:

The appliance shall be tested until stable conditions are reached.

Addition of the following subclause not contained in this part 2:

CC.19.8 *Addition:*

The test is repeated after interchanging two of the three-phase leads in the plug to induce rotation in the wrong sense, if possible, and if there is no warning signal for incorrect rotation sense.

CC.22 Construction

This clause of this part 2 is applicable except as follows:

CC.22.201 The suction fan shall be on the clean air side and shall be protected against intake of particles greater than 8 mm.

Compliance is checked by inspection and measurement.

CC.22.202 Appliances shall be so constructed that a minimum of dust will deposit in or on the appliance.

Compliance is checked by inspection.

CC.22.203 Outer parts of the appliance, parts enclosing collected dust, nozzles and dust conduits shall not be made from aluminium containing more than 7,5 % of magnesium and not be coated with aluminium coating.

Nozzles made of cast aluminium containing more than 7,5 % of magnesium have to be protected against impact by steel or resilient protectors.

Compliance is checked by inspection.

CC.22.204 Dust deflectors shall not be made of materials that generate sparks on impact.

Compliance is checked by inspection.

CC.22.205 Downstream of the essential filter the air is considered to be free of combustible dust.

CC.23 Internal wiring

Addition:

Cables and wires not within the IP54 compartment shall not be lighter than 60245 IEC 66.

NOTE This requirement does not apply to external data wiring, for which national regulations might apply.

Compliance is checked by inspection.

CC.24 Components

This clause of this part 2 is applicable except as follows:

Addition:

CC.24.1 Addition:

Components located within enclosures containing collected **combustible dust** shall be suitable for **Zone 20**.

Compliance is checked by inspection.

CC.24.201 Filters for cooling air needed to comply with CC.6.2 shall only be removable with the aid of a tool.

Compliance is checked by inspection.

CC.25 Supply connection and external flexible cords

This clause of this part 2 is applicable except as follows:

CC.25.1 *Addition:*

Appliance inlets shall be so arranged, that the plug is inserted from below. When disconnected, the appliance inlet shall be protected against deposition of dust by a permanently attached dust cover.

Compliance is checked by inspection.

CC.25.7 *Addition:*

Power supply cords for **Type 22** appliances shall not be lighter than 60245 IEC 66.

NOTE This requirement does not apply to external data wiring, for which national regulations might apply.

Compliance is checked by inspection.

CC.30 Resistance to heat and fire

This clause of this part 2 is applicable except as follows:

Addition:

CC.30.2 *Addition:*

Non-metallic parts surrounding collected **combustible dust** shall be resistant to ignition and spread of fire. This requirement does not apply to removable dust-collection media placed within the flame-resistant enclosure, e.g. paper disposal bags.

Compliance is tested as follows:

*Non-metallic parts covering but not supporting the collected **combustible dust** are subjected to the glow-wire test according to IEC 60695-2-11, the test being made at a temperature of 550 °C.*

*Non-metallic parts supporting the collected **combustible dust** shall have a glow-wire flammability index of at least 850 °C according to IEC 60695-2-12, the test sample being no thicker than the relevant part and are subjected to the glow-wire test according to IEC 60695-2-11, the test being made at a temperature of 750 °C. Parts that withstand the glow-wire test of IEC 60695-2-11, but which, during the test, produce a flame that persists for longer than 2s, are subjected to the needle-flame test of Annex E.*

The needle-flame test is not carried out on parts which are made of material classified as V-0 or V-1 according to IEC 60695-11-10, provided that the test sample was not thicker than the relevant part.

NOTE The test of CC.30.2 is not carried out on appliances exclusively denoted for wood, having a maximum rated power of 1200 W and the volume of whose dust container does not exceed 50 dm^3 .