



DPC: 15 / 30265239 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Title: Draft BS EN 60335-2-69 AMD 1 Household and similar electrical appliances - Safety -

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

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Responsible Committee Secretary: Ms Snezhana Halacheva (BSI)

Direct tel: 020 8996 7288

E-mail: snezhana.halacheva@bsigroup.com

Introduction

This draft standard is based on European discussions in which the UK took an active part. Your comments on this draft are welcome and will assist in the preparation of the consequent British Standard. Comment is particularly welcome on national legislative or similar deviations that may be necessary.

Even if this draft standard is not approved by the UK, if it receives the necessary support in Europe, the UK will be obliged to publish the official English Language text unchanged as a British Standard and to withdraw any conflicting standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with reasons) or positive vote on this draft.

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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	Comment (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.	



61J/608/CDV

COMMITTEE DRAFT FOR VOTE (CDV)
PROJET DE COMITÉ POUR VOTE (CDV)

Project number Numéro de projet		IEC 60335-2-69-A1/Ed4	
IEC/TC or SC: SC61J CEI/CE ou SC:		Secretariat / Secrétariat Germany	
☒ Submitted for parallel voting in CENELEC ☐ Soumis au vote parallèle au CENELEC	Date of circulation Date de diffusion 2015-01-09	Closing date for voting (Voting mandatory for P-members) Date de clôture du vote (Vote obligatoire pour les membres (P)) 2015-04-10	
Also of interest to the following committees Intéresse également les comités suivants		Supersedes document Remplace le document 61J/507/CD and 61J/529/CC	
Proposed horizontal standard Norme horizontale suggérée ☒ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the TC/SC secretary Les autres CE/SC sont requis d'indiquer leur intérêt, si nécessaire, dans ce CDV à l'intention du secrétaire du CE/SC			
Functions concerned Fonctions concernées ☒ Safety Sécurité ☐ EMC CEM ☐ Environment Environnement ☐ Quality assurance Assurance qualité			

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Titre : IEC 60335-2-69-A1/Ed4:

Title : IEC 60335-2-69-A1/Ed4: Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners for commercial use

Note d'introduction

Introductory note

ATTENTION VOTE PARALLÈLE CEI – CENELEC L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet de comité pour vote (CDV) de Norme internationale est soumis au vote parallèle. Les membres du CENELEC sont invités à voter via le système de vote en ligne du CENELEC.	ATTENTION IEC – CENELEC PARALLEL VOTING The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) for an International Standard is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.
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CONTENTS

FOREWORD	4
INTRODUCTION	7
1 Scope	8
2 Normative references.....	9
3 Terms and definitions	9
4 General requirement.....	12
5 General conditions for the tests.....	13
6 Classification.....	13
7 Marking and instructions	13
8 Protection against access to live parts.....	17
9 Starting of motor-operated appliances	17
10 Power input and current	17
11 Heating	17
11.8 <i>Modification:</i>	18
12 Void	18
13 Leakage current and electric strength at operating temperature	18
14 Transient overvoltages.....	18
15 Moisture resistance	19
16 Leakage current and electric strength	21
17 Overload protection of transformers and associated circuits.....	21
18 Endurance	21
19 Abnormal operation	21
20 Stability and mechanical hazards	22
21 Mechanical strength.....	23
22 Construction.....	25
22.54 <i>This clause is not applicable.</i>	26
23 Internal wiring	27
24 Components.....	27
25 Supply connection and external flexible cords	28
26 Terminals for external conductors.....	29
27 Provision for earthing.....	29
28 Screws and connections	29
29 Clearances, creepage distances and solid insulation	30
30 Resistance to heat and fire	30
31 Resistance to rusting	30
32 Radiation, toxicity and similar hazards	30
Annexes	35
Annex A (normative) Routine tests.....	36
Annex B (normative) Appliances powered by rechargeable batteries	37
Annex S (normative) Battery-operated appliances powered by batteries that are nonrechargeable or not recharged in the appliance	38

Annex AA (normative) Particular requirements for vacuum cleaners and dust extractors for the collection of hazardous dusts	39
Annex BB (informative) List of dusts which present an explosion risk when subject to ignition conditions.....	51
Annex CC (informative) Particular requirements for vacuum cleaners and dust extractors providing equipment protection level Dc for the collection of combustible dusts	57
Annex DD (normative) Particular requirements for vacuum cleaners for use in ESD protected areas	69
Annex EE (informative) Emission of acoustical noise	72
Annex FF (informative) Emission of vibration	79
Annex GG (normative) Particular requirements for mobile wet vacuum cleaners for rescue and firefighting services (MWF)	80
Bibliography	87
Figure 101 – Impact test apparatus.....	31
Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses.....	32
Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses	32
Figure 104 – Configuration of the hose for the freezing treatment.....	33
Figure 105 – Flexing positions for the hose after removal from the freezing cabinet	33
Figure AA.1 – Warning label for dust class H machines	47
Figure AA.2 – Warning label for dust class L and dust M machines	48
Figure AA.3 – Test method for essential filter material	49
Figure AA.4 – In situ essential filter element test	49
Figure AA.5 – Assembled machine test	49
Figure AA.6 – Sequence and selection of tests according to Clause 22	50
Figure EE.1 – Position of vacuum cleaners and its accessories.....	76
Figure EE.2 – Position of upright machines	77
Figure EE.3 – Position of back-pack vacuum cleaners	78
Table 12 – Pull force and torque.....	29
Table AA.1 – Penetration limits	42
Table BB.1 – Explosion parameters	51

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

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

FOREWORD

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International Standard IEC 60335-2-69 has been prepared by subcommittee 61J: Electrical motor-operated cleaning appliances for commercial use, of IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition cancels and replaces the third edition published in 2002 and its Amendments 1 (2004) and 2 (2007). It constitutes a technical revision.

The principal changes in this edition as compared with the third edition of IEC 60335-2-69 are as follows (minor changes are not listed):

- the scope has been revised editorially to avoid misunderstandings;
- terms and definitions has been revised with regard to the requirements revised;
- the standard has been revised in general and updated regarding state-of-the-art, as far as necessary, in particular some changes have been made to Clauses 15, 22 and 25;

- Annex AA was revised and restructured;
- Annex CC was made informative;
- a new Annex EE 'Emission of acoustical noise' was added; and
- a new Annex FF 'Emission of vibration' was added.

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

FDIS	Report on voting
61J/481/FDIS	61J/494/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fifth edition (2010) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for wet and dry vacuum cleaners, including power brush, for commercial use.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of the amendment 2 be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

- 25.6: Additional requirements for the plug apply (Germany)

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

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

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

A bilingual version of this publication may be issued at a later date.

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

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

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

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electrical motor-operated vacuum cleaners, including **back-pack vacuum cleaners**, and **dust extractors**, for wet suction, dry suction, or wet and dry suction, intended for commercial indoor or outdoor use with or without attachments. They may be provided with a blowing or inflating function.

It also deals with the safety of **centrally-sited vacuum cleaners**, excluding the installation of the system.

NOTE 101 Attention is drawn to the fact that additional requirements on the safe installation of **centrally-sited vacuum cleaners** are not addressed by this standard but need to be taken into account.

NOTE 102 This standard applies to machines for **commercial use**. The following list, although not comprehensive, gives an indication of locations that are included in the scope:

- public use areas such as hotels, schools, hospitals;
- industrial locations, for example factories and manufacturing shops;
- retail outlets, for example shops and supermarkets;
- business premises, for example offices and banks;
- all uses other than normal housekeeping purposes.

They are not equipped with a traction drive. The following power systems are covered:

- mains powered motors up to a **rated voltage** of 250 V for single-phase appliances and 480 V for other appliances,
- battery powered motors.

This standard also applies to machines handling **hazardous dust**, such as asbestos.

NOTE 103 Additional requirements for machines handling **hazardous dust** are given in Annex AA. Attention is drawn to the fact that in many countries additional requirements on hazardous substances might apply.

NOTE 104 Radioactive substances are not covered by definition of **hazardous dust** for the purposes of this standard.

This standard does not apply to

- vacuum cleaners and water-suction cleaning appliances for household use (IEC 60335-2-2);
- floor treatment machines for **commercial use** (IEC 60335-2-67, IEC 60335-2-72);
- spray extraction machines for **commercial use** (IEC 60335-2-68);
- hand-held mains-operated electrical garden blowers, vacuums and blower vacuums (IEC 60335-2-100);
- hand-held and transportable motor-operated electric tools (IEC 60745 series, IEC 61029 series);
- appliances for medical purposes (IEC 60601-1);

- machines designed for use in corrosive environments;
- machines designed for picking up liquids with a flash point below 55 °C;
- machines designed for use in explosive environments (dust, vapour or gas), except those designed for use in **zone 22**.

NOTE 104 The flash point temperature limit may vary in different countries. National regulations will need to be taken into account.

NOTE 105 Additional requirements for vacuum cleaners designed for collecting **combustible dust** in **zone 22** are given in Annex CC.

NOTE 106 Attention is drawn to the fact that in many countries additional requirements on the safe use of the equipment covered can be specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60312-1, *Vacuum cleaners for household use – Part 1: Dry vacuum – Methods for measuring the performance*

ISO 2602, *Statistical interpretation of test results – Estimation of the mean – Confidence interval*

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

ISO 7731, *Ergonomics – Danger signals for public and work areas – Auditory danger signals*

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 Replacement:

normal operation

conditions under which the machine is operated in normal use, obtained at the following power input P_m of the vacuum motor:

$$P_m = 0,5 (P_f + P_i)$$

where

P_f is the input, in watts, when the machine has been operated for 3 min, fitted with the nozzle and hose giving the highest input;

P_i is the input, in watts, when the machine has been operated for 20 s with the nozzle sealed, immediately following the 3-minute-period with the nozzle open. Any valve or similar device used to ensure a flow of air to cool the motor in the event of a blockage of a main air inlet is rendered ineffective.

P_f and P_i are measured with the supply voltage adjusted to **rated voltage**, or to a voltage equal to the mean value of the **rated voltage range** if the difference between the limits of the **rated voltage range** does not exceed 10 % of the mean value of the range. If the difference

between the limits of the **rated voltage range** exceeds 10 % of the mean value, the tests are carried out with the supply voltage set to the upper limit of the range.

The measurements are made with the machine fitted with a clean dust bag and filter and with the water container, if any, empty. If the machine is intended for use only with a hose, detachable nozzles are removed and the hose is laid out straight. If the machine is provided with a hose as an optional accessory, it is operated without the hose.

Electrically driven devices, if any, are in operation but are not in contact with the floor or any other surface or with the means used to seal the air inlet.

The normal load is equal to the mean load P_r for the electrically driven agitating device such as a motor driven brush determined in accordance with the following:

- the agitating device operates on a carpet as specified in IEC 60312-1;
- the mean load P_r is determined when using the device in the following way:
After setting the device, the device is moved twice over a distance of 5 m in the direction giving the highest load;
- the motor responsible for the airflow operates under the same conditions as for determining P_f , i.e. no airflow restrictions, and measurements are taken after 3 min;
- the device is adjusted to the carpet pile height;
- it is necessary to move the agitating device slowly across the carpet to avoid carpet damage.

Soiled water discharge pumps, if applicable, are operated as follows.

The pump delivers a continuous flow of water without any soiled water discharge hose attached to the soiled water outlet of the machines unless the discharge hose is permanently attached to the machine. The vacuum motor works during the test, unless an interlock device is provided to prevent combined operation of both motors.

Machines equipped with an inflating function are also operated whilst equipped with the hose as described in the instructions for use. The hose is placed in a straight line away from the machine. Power adjustment controls are set to the highest input power.

Machines equipped with a blowing function are also operated whilst equipped with the two hoses or as described in the instructions for use. Both hoses are placed in a straight line away from the machine. Power adjustment controls are set to the highest input power. The blowing hose is not equipped with any attachments, e.g. nozzles.

3.101

water-suction cleaning machine

machine for sucking up a water-based cleaning solution

3.102

back-pack vacuum cleaner

vacuum cleaner designed to have the power source and collector carried on the **operator's** back by means of a supporting device

3.103

motorized cleaning head

hand-held or hand-guided cleaning device connected to the machine, with an integrated electrical motor

Note 1 to entry: The permanently attached main cleaning head is not regarded as a **motorized cleaning head**.

3.104

hazardous dust

non-radioactive dust which is hazardous to health if inhaled, ingested or in contact with the skin

Note 1 to entry: EC Directive 79/831/EEC amending 67/548/EEC lists dusts for which the general indication of nature of risk is specified as very toxic, harmful, corrosive or irritant; some dusts can be subject to an exposure limit in the country of use; micro-organisms can be considered as dusts creating a hazard to the health of a person.

Note 2 to entry: Requirements for machines intended to pick up **hazardous dust** are specified in Annex AA.

3.105

combustible dust [taken from IEV 426-02-18]

finely divided solid particles, 500 µm or less in nominal size, which may be suspended in air, may settle out of the atmosphere under their own weight, may burn or glow in air, and may form explosive mixtures with air at atmospheric pressure and normal temperatures

NOTE to entry 1: This includes dust and grit as defined in ISO 4225.

NOTE 2 to entry: The term solid particles is intended to address particles in the solid phase and not the gaseous or liquid phase, but does not preclude a hollow particle.

3.106

explosive dust atmosphere [taken from IEV 426-01-08]

mixture with air, under atmospheric conditions, of flammable substances in the form of dust, fibres

or flyings which, after ignition, permits self-sustaining propagation

Note 1 to entry: Minimum ignition energy values for common dusts can be found in Annex BB.

Note 2 to entry: Requirements for machines intended to pick up **combustible dust** in an **explosive atmosphere** are specified in Annex CC.

3.107

ESD protected area

EPA

area with a minimum risk for electrostatic discharge that could damage electronic devices, and in which people present in that area are not subjected to any additional risk

Note 1 to entry: Requirements for machines intended to pick up dust in **ESD protected areas** are specified in Annex DD.

3.108

dust extractor

stationary or portable equipment specifically designed to be connected to dust-generating machines

Note 1 to entry: A vacuum cleaner is designed to pick up already settled dust.

3.109

centrally-sited vacuum cleaner

vacuum cleaner that is connected to a ducting system installed in the building

Note 1 to entry: During use, the nozzle and its associated hose are connected to one of the suction inlets of the ducting system.

3.110

guard

part of the machine specifically designed to provide protection by means of a physical barrier, such as, for example, a casing, a shield, a cover, a screen, a door, an enclosure or a fence; other parts of the machine that fulfil a primarily operational function, such as, for example, the frame of the machine, may also fulfil a protective function but are not referred to as **guards**

Note 1 to entry: Three main kinds of **guards** can be distinguished: fixed **guards**, interlocking moveable **guards** and adjustable **guards**. Interlocking moveable **guards** are required where frequent access is envisaged, while fixed **guards** can be used where frequent access is not envisaged.

3.111

operator

person installing, operating, adjusting, cleaning, moving, or performing **user maintenance** on the machine

3.112**test solution**

solution which 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

Note 1 to entry: The chemical designation of dodecyl sodium sulphate is $C_{12}H_{25}NaSO_4$.

3.113**commercial use**

intended use of machines covered by this standard, i.e. not intended for normal housekeeping purposes by private persons but which may be a source of danger to the public

i.e. in particular that

- the machines may be used by cleaning contractors, cleaning staff, etc.;
- they are used in commercial or public premises (i.e. offices, shops, hotels, hospitals, schools, etc.) or in industrial (plants, etc.) and light industrial (workshops, etc.) environments.

Note 1 to entry: **Commercial use** is also called professional use.

3.114**mobile machine [taken from IEC 151-16-45, modified]**

machine capable of being moved from one location to another

NOTE 1 to entry: This includes portable and hand-held appliances, and excludes fixed and stationary appliances.

3.115**MWF vacuum cleaner**

vacuum cleaner for **picking up liquids, intended to be used by rescue and** firefighting services, integrating a pump for a continuous disposal of the sucked up liquid

NOTE 1 to entry: **MWF** is the abbreviation of **Mobile Wet** vacuum cleaners for **rescue and** Firefighting **and rescue** services.

3.116**Inflating function**

Operation mode with the clean air exhaust used to inflate objects with the standard suction hose connected to the air outlet of the machine. Only one hose is connected to the machine at a time.

3.117**Blowing function**

Operation mode with the clean air exhaust connected to an air exhaust hose as specified in the instructions for use. The purpose is to transport the clean exhaust air away from the working location. In this case, two hoses are connected to the vacuum cleaner simultaneously.

4 General requirement

This clause of Part 1 is applicable except as follows.

Replacement of the first paragraph by the following:

Machines shall be constructed so that they function safely so as to cause no danger to persons or surroundings during normal use, even in the event of carelessness, and during installation, adjusting, maintenance, cleaning, repairing or transportation.

Addition:

For the purpose of this standard, the term 'appliance' as used in Part 1 is to be read as 'machine'.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.101 *The **test solution** is to be stored in a cool atmosphere and used within seven days after its preparation.*

6 Classification

This clause of Part 1 is applicable, except as follows.

6.1 Replacement:

Vacuum cleaners and their attachments shall be of one of the following classes with respect to the protection against electric shock:

- class I,
- class II, or
- class III.

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

Compliance is checked by inspection and by the relevant tests.

6.2 Addition:

Water suction cleaning machines and products intended for outdoor use and storage shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable, except as follows.

7.1 Replacement of the 4th dashed item as follows:

- the business name and address of the manufacturer and, if applicable, his authorized representative; any address shall be sufficient to ensure postal contact;

Addition:

Machines shall be marked in addition with the following:

- serial number, if any;
- designation of the machine and series or type, allowing the technical identification of the product. This may be achieved by a combination of letters and/or numbers;

NOTE 101 Designation of machine, series or type includes the model or type reference as required in Part 1.

- year of construction, i.e. the year in which the manufacturing process is completed;

NOTE 102 The year of construction can be part of the serial number.

- machines equipped with wheels and other mobile machinery shall be marked with the mass of the most usual configuration in kg.

When permitted by Table 101, the appliance may be marked adjacent to the air outlet with:

- the substance of “CAUTION: Hot surface”, or

- symbol IEC 60417-5041.

7.1.101 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;
- mass of the most usual configuration in kg.

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 (2012-09).

NOTE This symbol is an information sign and, except for the colours, the rules of ISO 3864-1 apply.

Compliance is checked by inspection.

7.1.102 Socket-outlets for accessories shall be marked with the maximum load in watts on the socket-outlet or close to it.

Compliance is checked by inspection.

7.6 Addition:



[symbol IEC 60417-5935 (2012-09)]

motorized cleaning head for
water-suction cleaning



[symbol IEC 60417-5041 (2002-10)]

caution, hot surface

7.12 Modification:

Replace the 4th paragraph by the following text.

This machine is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge.

Addition:

The front cover of the instructions shall include the substance of the following warning:

CAUTION Read the instruction manual before using the machine.

This wording may be replaced by symbols ISO 7000-0434A (2004-01) and ISO 7000-0790 (2004-01).

If symbol IEC 60417-5041(2002-10) is marked on appliances, its meaning shall be explained

The instructions shall contain at least the following:

- the business name and full address of the manufacturer and, if applicable, his authorized representative;
- designation of series or type of the machine as marked on the machine itself, except for the serial number;

NOTE 101 The designation of series or type can be abstracted, as long as the identification of the product is ensured.

- the general description of the machine;
- the intended use of the machine and the auxiliary equipment as covered by the scope of this standard;

NOTE 102 Examples of auxiliary equipment are **motorized cleaning heads** and lights.

- the meaning of the symbols used on the machine and in the instructions;
- drawings, diagrams, descriptions and explanations necessary for the safe use, maintenance and repair of the machine and for checking its correct functioning;
- technical data including the markings on the machine;
- information regarding putting into service, safe operation, handling, transportation, and storage of the machine taking into account its weight;
- instructions to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations;
- the conditions in which the machine meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;
- the procedure to be followed to prevent unsafe situations in the event of accident (e.g. contact with or spillage of detergents, battery acid, fuel or oil) or equipment breakdown;
- the substance of the following:

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

The instructions shall indicate the type and frequency of inspections and maintenance required for safe operation, including preventive maintenance measures. They shall, if applicable, give the specifications of the spare parts if they affect the health and safety of the **operator**, e.g. filter elements.

In addition, the instructions shall give the following information, if applicable:

- for battery powered machines, instructions regarding the precautions to be taken for safe charging;
- precautions to be taken when changing brushes or other attachments;
- information on the detergents or other liquids that may be used including the choice and use of personal protective equipment (PPE);
- essential characteristics of auxiliary equipment which may be fitted to the machine;
- information regarding safe disposal of batteries;
- purposes of the socket outlet on the machine;
- the precautions to be taken when using the machine under specific conditions such as handling flammable liquids or dusts and dusts hazardous to health;
- wet filters and the interior part of the liquid container shall be dried before storage.
- the intended use of the brushes specified for the machine.

7.12.101 The instructions shall include warnings concerning ways in which the machine shall not be used, which in the experience of the manufacturer are likely to occur. At least, it shall include the substance of the following warnings, if applicable.

- **WARNING** Operators shall be adequately instructed on the use of these machines.

- WARNING This machine is not suitable for picking up hazardous dust.
- WARNING This machine is for dry use only.
- CAUTION This machine is for indoor use only.
- CAUTION This machine shall be stored indoors only.
- A warning that the machine shall be disconnected from its power source during cleaning or maintenance and when replacing parts or converting the machine to another function:
 - for mains operated machines by removing the plug from the socket-outlet;
 - for battery powered machines by safely disconnecting at least the B+ or B– pole of the battery or an equivalent method (disconnecting device); for non-SELV both poles must be disconnected.

Instructions for mains operated machines shall also include the substance of the following:

- WARNING Do not allow the supply cord to come into contact with the rotating brushes.
- WARNING Only use the socket outlet on the machine for purposes specified in the instructions.

Instructions for water suction cleaning machines shall also include the substance of the following:

- WARNING If foam or liquid escapes from the machine, switch off immediately.
- CAUTION Clean the water level limiting device regularly and examine it for signs of damage.

Instructions for machines having a current-carrying hose for dry suction, operating at other than **safety extra-low voltage** shall also include the substance of the following:

- WARNING This hose contains electrical connections: do not use it to collect water and do not immerse in water for cleaning.

Compliance is checked by inspection.

7.12.102 Information on noise

NOTE The instructions can include information on airborne noise emission as indicated in EE.2.7.

7.12.103 Information on vibration

NOTE The instructions can include information on the vibration total value as indicated in Clause FF.2.

7.12.104 The instructions for use of vacuum cleaners with **blowing or inflating functions** shall include information concerning the use of these functions and the nominal overpressure.

The instructions for use of vacuum cleaners with inflating functions shall include this function is not intended for blowing away deposited dust.

7.13 Addition:

The words “Original instructions” shall appear on the language version(s) verified by the manufacturer.

7.14 Addition:

The height of symbol IEC 60417-5935 (2012-09) shall be at least 15 mm.

The height of symbol IEC 60417-5041 shall be at least 10 mm.

Compliance is checked by measurement.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 Addition:

Water and water-borne cleaning agents are considered conductive.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 Addition:

If it is necessary to dismantle the machine for fitting thermocouples or other wiring, the input shall be measured before and after fitting at the lowest possible load, for example, with closed suction openings, with brushes not in contact with the floor, with declutched drive, etc. to check that the assembling has been accomplished properly.

Where the accessible external surfaces are suitably flat and access permits, then the test probe of Figure 106 may be used to measure the temperature rises of accessible external surfaces specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ to the surface in such a way that the best possible contact between the probe and the surface is ensured.

NOTE 102 The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

11.4 Not applicable.

11.5 Addition:

For the heating test, the normal load P_r on the motor driving the moving brushes can be simulated by a brake or other means.

11.6 Not applicable.

11.7 Addition:

Machines are operated until steady conditions are established.

11.8 Modification:

Replace the first paragraph by the following: "During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101".

*In Table 3 delete the row "External enclosure of **motor-operated appliances**, except handles held in normal use" and the corresponding footnotes.*

Add the following Table 101.

Table 101 – Maximum temperature rises for specified external surfaces under normal operating conditions

Surface	Temperature rise of external surfaces K	
	Surfaces of hand held Appliances ^e	Surfaces of other appliances ^d
Bare metal	42	48
Coated metal ^a	49	59
Glass and ceramic	56	65
Plastic and plastic coating > 0,4 mm ^b	62	74
^a Metal is considered coated when a coating having a minimum thickness of 90 µm made by enamel or non-substantially plastic coating is used. ^b The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm. ^c When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of the coated metal or of glass and ceramic material apply ^d For air outlets and an area 25 mm surrounding the above values can be twice the limit but the product shall be marked with the wording as stated in 7.1. ^e For air outlets the above values can be increased by 5 K. NOTE Some limit less than 2X is surely achievable for process air outlets of wet vacuum cleaners.		

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 Addition:

*For **class I appliances** where several motors operate at the same time, the leakage current shall not exceed 3,5 mA.*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 Addition:

Water-suction cleaning machines are operated for 10 min on a level surface wetted by the test solution.

In practice, the pick-up consists largely of air such that there is no overloading of the suction motor; the input load should be observed to avoid overloading.

15.2 Replacement:

Machines having a liquid container shall be so constructed that

- spillage of liquid due to **normal operation**,
- filling including overfilling, and
- overturning of unstable machines

do not affect their electrical insulation.

Compliance is checked by the following tests:

The machine is placed on a support inclined at an angle of 10 ° to the horizontal, the liquid container being filled to half the level indicated in the instructions. A machine is considered to be unstable if it overturns when a force of 180 N is applied to the top of the machine in the most unfavourable horizontal direction.

*Machines having a liquid container and provided with an appliance inlet are fitted with an appropriate connector and flexible cable or cord; machines having a liquid container and **type X attachment** are fitted with the lightest cross-sectional area specified in Table 11. Other machines are tested as delivered.*

The liquid container of the machine is completely filled with a saline solution of water containing approximately 1 % NaCl and 0,6% rinsing agent and a further quantity, equal to 15 % of the capacity of the container or 0,25 l, whichever is the greater, is poured in steadily over a period of 1 min.

Any commercially available rinsing agent may be used, but if there is any doubt with regards to the test results, the rinsing agent shall have the following properties:

- viscosity, 17 mPa · s;
- pH, 2,2 (1 % in water).

and its composition shall be

Substance	Parts by mass %
Plurafac ® LF 221 ¹	15,0
Cumene sulfonate (40 % solution)	11,5
Citric acid (anhydrous)	3,0
Deionized water	70,5

¹ Plurafac ® LF 221 is the trade name of a product supplied by BASF. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

Machines which are unstable are then, with the container completely filled and with the cover or lid in place, overturned from the most unfavourable of the normal positions of use, and are left in that position for 5 min unless the machine returns automatically to its normal position of use.

Nozzles and **motorized cleaning heads** of **water-suction cleaning machines** are placed in a tray, the base of which is level with the surface supporting the machine. The tray is filled with the **test solution** to a level of 5 mm above its base, this level being maintained throughout the test. The machine including the **motorized cleaning head** is operated until its liquid container is completely full and afterwards for a further 5 min.

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

There shall be no trace of liquid on insulation that reduces the **clearances** or **creepage distances** below the values specified in Clause 29.

15.3 Modification:

The relative humidity shall be $(93 \pm 6) \%$.

15.101 Motorized cleaning heads of water suction cleaning machines shall be resistant to liquids that may come into contact with them during normal use.

The following test is not applicable to **motorized cleaning heads of class III construction** having a **working voltage** up to 24 V.

Compliance is checked by the following four 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 60068-2-31. 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

- 1 000 times on its right side;
- 1 000 times on its left side;
- 1 000 times on its front face;
- 1 000 times on its cleaning surface.

The **motorized cleaning head** is then subjected to the test described in 14.2.4 of IEC 60529, using the **test solution**.

The **motorized cleaning head** is to be operated in a flat-bottomed vessel filled with a saline solution of water containing approximately 1 % NaCl so that a depth of 3,0 mm of water is maintained. The vessel is to be a size such that the **motorized cleaning head** moves about freely, and is to be operated:

- without connection to the vacuum cleaner for 15 min, if applicable; and
- connected to the vacuum cleaner until the vacuum cleaner has picked up as much water as its capacity holds or for 5 min, whichever occurs sooner.

The **motorized cleaning head** shall then withstand the electric strength test of 16.3, the voltage being applied between the **live parts** and the **test solution**. There shall be no trace of saline solution on insulation that reduces the **clearances** or **creepage distances** below the values specified in Clause 29.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.3 Addition:

Current-carrying hoses, except for their electrical connections, are immersed for 1 h in a saline solution of water containing approximately 1 % NaCl, at a temperature of $20\text{ °C} \pm 5\text{ °C}$. 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.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Addition:

Machines are also subjected to the test of 19.101.

*The test of 19.7 is only carried out on **motorized cleaning heads** and fan motors of **centrally-sited vacuum cleaners**.*

NOTE 101 Separate fan motors are not intended for vacuuming, but for cooling the equipment. These motors are independent from the main vacuum motor.

Dust extractors are also subjected to the tests of 19.102, and 19.103 if applicable.

Centrally-sited vacuum cleaners are also subjected to the tests of 19.104, and 19.105 if applicable.

19.2 Addition:

The machine is tested without liquid in the container.

NOTE 101 The term restricted heat dissipation of Part 1 means without liquid in the container.

19.7 Addition:

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

Unattended dust extractors are operated until steady conditions are reached.

Separate fan motors of **centrally-sited vacuum cleaners** are operated until steady conditions are reached.

NOTE 101 Separate fan motors are not intended for vacuuming, but for cooling the equipment. These motors are independent from the main vacuum motor.

19.9 Not applicable.

19.10 Addition:

For this test, the lowest possible load for radial turbines is obtained with the air inlet sealed. For other types of turbines, the characteristics shall be taken into account.

In the case of cleaners driving a brush or agitator, the belt is removed.

19.13 Modification:

In the second paragraph, add “and 22.104” after “20.2”.

19.101 *Machines having liquid containers that are provided with shut-off device(s) or valve(s) are again subjected to the test of 15.2.*

Stop valves or other fluid shut-off devices are made inoperative. If two or more independent shut-off devices are provided, only one of them is made inoperative at a time, provided that they have passed the test of operating 3 000 times satisfactorily. Otherwise all devices that failed are made inoperative.

Care should be taken to suck up an air-liquid mixture to prevent overloading of the motor of the suction unit. The input power should be observed to avoid overloading.

*After this test, the machine shall be subjected to the electrical strength test of 16.3. Inspection shall show that water has not entered the machine to any dangerous extent. In particular, there shall be no trace of water on the electrical insulation that reduces the **clearance** or **creepage distances** below the limits specified in Clause 29.*

19.102 *Dust extractors for which 30.2.3 applies are supplied at **rated voltage** and operated with the inlet for the suction hose closed.*

The temperatures of the windings shall not exceed the values specified in 19.9.

19.103 *Dust extractors for which 30.2.3 applies with separate ventilation for the motor are supplied at **rated voltage** and operated with the airflow through the motor blocked.*

The temperatures of the windings shall not exceed the values specified in 19.9.

19.104 *Centrally-sited vacuum cleaners are supplied at **rated voltage** and operated with the inlet for the suction hose open and then closed.*

The temperatures of the windings shall not exceed the values specified in 19.9.

19.105 *Centrally-sited vacuum cleaners with separate ventilation for the motor are supplied at **rated voltage** and operated with the airflow through the motor blocked.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 Modification:

Add to the existing NOTE:

Aluminum oxide paper (grain size 80) or similar material may be used to prevent sliding. Addition:

Motorized cleaning heads are not subjected to this test.

20.2 Addition:

These requirements do not apply to rotating brushes and similar devices, or to moving parts exposed during the fitting of accessories that allow conversion from one application to another.

20.101 Shaft ends and similar rotating parts shall be protected if they protrude by more than a quarter of their diameter. Shafts up to 50 mm diameter do not need to be protected if they are rotating at less than 5 revolutions per second, and their ends are rounded and smooth.

*Compliance is checked by inspection and measurement, the machine having all pads, brushes etc. in place for **normal operation**.*

The unintentional closing and lowering of doors, lids, covers etc., which could cause injury, shall be prevented.

Machines heavier than 20 kg (empty weight), except stationary machines and **back-pack vacuum cleaners**, shall be equipped with wheels or rollers for transport, which shall be located or protected so as to prevent injury to the feet of the **operator**.

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

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 Replacement of the first paragraph:

Machines and their **components** and fittings shall have adequate mechanical strength and be constructed to withstand such rough handling as may be expected in normal use, during transportation, assembly, dismantling, scrapping and any other action involving the machine.

Modification in the third paragraph:

The impact value is increased to $1,0 \text{ J} \pm 0,04 \text{ J}$.

21.101 Those parts of the machine that are subjected to impact in normal use are tested as follows:

*If failure of the part subjected to impact would cause a failure to comply with this specification, any spot of the machine which may be exposed during **normal operation** to impacts or blows shall be subjected to a single blow with an impact energy of 6,75 Nm. The impact stress on the free-standing machines shall be exerted by a steel sphere with a diameter of 50,8 mm and a mass of 0,535 kg dropped from a height of 1,3 m or hanging on a string acting as a pendulum, falling from a height of 1,3 m.*

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 $\pm$ 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 P100, 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 $\pm$ 5 mm. The arm can be raised from the horizontal position by an angle of 40 ° $\pm$ 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 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 $\pm$ 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.

After 10 000 revolutions, the hose shall withstand the electric strength test of 16.3.

If the hose ruptures before 10 000 revolutions are achieved, the flexing test is terminated. The hose shall still 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 $-15\text{ °C} \pm 2\text{ °C}$. Immediately after the hose is removed from the cabinet it is flexed three times, as shown in Figure 105, 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. Any colour change of the hose is not considered as a failure.

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 Addition:

Water-suction cleaning machines shall be so constructed that neither water nor foam from detergents can penetrate into the motor or come in contact with **live parts**.

22.35 Addition:

These parts are subject to the hammer test of Clause 21. If this insulation does not meet the requirement of 29.3, these are subject to the following impact test.

A sample of the covered part is conditioned at a temperature of $70\text{ °C} \pm 2\text{ °C}$ for seven days (168 h). After conditioning, the sample is allowed to attain approximately room temperature.

Inspection shall show that the covering has not shrunk to such an extent that the required insulation is no longer given or that the covering has not peeled off, so that it may move longitudinally.

After this, the sample is maintained for 4 h at a temperature of $-10\text{ °C} \pm 2\text{ °C}$.