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REDLINE VERSION

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety –
Part 2-67: Particular requirements for floor treatment machines, for commercial use

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Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-67: Particular requirements for floor treatment machines, for commercial use

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-67:2012+AMD1:2016 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60335-2-67 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. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2012 and its Amendment 1: 2016. It constitutes a technical revision.

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

– editorial and technical alignment with IEC 60335-1:2020.

The text of this International Standard is based on the following documents:

CDV	Report on voting
61J/735/CDV	61J/742A/RVC

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

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

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

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 sixth edition (2020) 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: Particular requirements for floor treatment machines, 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.

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.

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 this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

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

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

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 2-67: Particular requirements for floor treatment machines, for commercial use

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of powered floor treatment machines intended for commercial indoor or outdoor use for the following applications:

– scrubbing,
– wet or dry pick-up,
– polishing and dry buffing,
– application of wax, sealing products and powder based detergents,
– shampooing,
– stripping, grinding and scarifying

of floors with an artificial surface.

~~Their~~ These machines have a cleaning motion which is more lateral or periodic than linear.

NOTE 101 By contrast, the cleaning motion of machines covered by IEC 60335-2-72 is more linear than lateral or periodic.

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~~ These machines are not equipped with a **traction drive**.

NOTE 103 Machines for the same intended function but equipped with a traction drive are covered by IEC 60335-2-72.

The following power systems are covered:

– internal combustion engines,
– mains powered motors up to a **rated voltage** of 250 V for single-phase appliances and 480 V for other appliances,
– ~~battery-powered motors~~ **battery-operated machines**.

~~Battery-powered machines~~ **Battery-operated machines** may be equipped with a built-in battery charger.

This standard does not apply to

– vacuum cleaners and water-suction cleaning appliances for household use (IEC 60335-2-2);

– floor treatment appliances for household use (IEC 60335-2-10);

– spray extraction machines for **commercial use** (IEC 60335-2-68);

– wet and dry vacuum cleaners, including power brush, for **commercial use** (IEC 60335-2-69);

NOTE 104 IEC 60335-2-68 and IEC 60335-2-69 cover only machines without traction drive.

– floor treatment machines with or without **traction drive**, for **commercial use** (IEC 60335-2-72);

– hand-held and transportable motor-operated electric **tools** (IEC 60745 series, IEC 61029 series, IEC 62841 series);

– machines designed for use in corrosive or explosive environments (dust, vapour or gas);

– machines designed for picking up hazardous dusts (as defined in IEC 60335-2-69), inflammable substances, or glowing particles;

– machines designed for use in vehicles or on board of ships or aircraft.

NOTE ~~103~~105 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 cleaners – Methods for measuring the performance*~~

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

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 ~~*Replacement*~~ *Addition:*
normal operation
conditions under which the machine is operated in normal use, as intended by the manufacturer

It denotes the load corresponding to the **rated power input** or the highest obtainable load of all particular loads of the various functions that can be operated at the same time according to the manufacturer's instructions.

Tanks of machines, if applicable, are filled before starting the operation to the highest level as indicated on the tank, or completely if no marking is provided.

~~Socket-outlets for accessories are loaded with a resistive load in accordance with the marking.~~ Suction functions, if applicable, are switched on during operation.

The **normal operation** related to the operational functions is specified in 3.1.9.101 to 3.1.9.103.

3.1.9.101 Scrubbing, stripping, grinding and scarifying machines are operated with the appropriate brushes or pads on a surface of hydraulically pressed concrete paving slabs (see normative Annex AA).

An alternative is a smooth concrete area of a surface consistency comparable with hydraulically pressed concrete paving slabs.

3.1.9.102 Polishing and dry buffing machines are operated as follows.

PVC or comparable surfaces are considered to be suitable for establishing **normal operation**. The peak of input occurring during the drying process of the chemical applied to treat the surface is not taken as **normal operation** but is averaged by extending measurements over a period of at least 10 min.

3.1.9.103 Carpet shampooers are operated on a test surface consisting of a carpet, in accordance with ~~IEC 60312-1~~ IEC TS 62885-1, the carpet being fastened to the floor.

Prior to testing, the brush of the shampooing machine is conditioned by operating it for 15 min on a clean, dry concrete surface. After running on the concrete surface the brush is immersed in a shampoo solution for at least 30 min.

3.101
water-suction cleaning machine
machine for applying and sucking up a water-based cleaning solution

3.102
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**.

3.103
traction drive
system used to propel the machine, e.g. by powered wheels

Note 1 to entry: Traction by the effect of rotating brushes is not included.

3.104
operator presence control
OPC
control device that automatically interrupts the power, e.g. to a drive or an engine, when the **operator**'s actuating force is removed

Note 1 to entry: Such devices ~~may~~ can be, for example, continuous action controls ("hold-to-run" controls).

3.105
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 movable **guards** are required where frequent access is envisaged, while fixed **guards** can be used where frequent access is not envisaged.

3.106
operator
person installing, operating, adjusting, maintaining, cleaning or moving the machine

3.107
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 $C_{12}H_{25}NaSO_4$.

3.108
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.

4 General requirement

This clause of Part 1 is applicable except as follows.

Replacement of the first paragraph by the following text:

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:*

Machines shall be one of the following classes with respect to the protection against electric shock:

– **class I**,

– **class II**, or

– **class III**.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Mains supplied machines for indoor use and intended for dry cleaning only, shall be at least IPX0. Other machines shall be at least IPX4. Machines for dry use that may be equipped with additional accessories transforming them into machines for wet application shall comply with IPX4 while being equipped with such accessories.

NOTE 101 Machines with detached accessories for wet cleaning can comply with IPX0 for dry cleaning purposes.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 ~~*Replacement of*~~ *Modification:*

Replace the fourth dashed item as follows:

– 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 shall be marked with the mass of the most usual configuration in kg.

Machines intended to be used indoors and powered by internal combustion engines shall be marked with the symbol according to Figure 106. It is acceptable to show this symbol in monochrome colour.

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

7.12 *Modification:*

Delete the first paragraph and the first warning.

Add after the Note the following new text:

NOTE 101 Alternative requirements for instructions in hard copy form are available in 7.12.9.

Replacement of the fourth 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 instructions before using the machine.

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

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 ~~must be~~ 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 spray units, suction units, 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**.

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;

– the intended use of the brushes specified for the machine;

– if split rims are used for pneumatic tyres, instructions shall be given for the safe change of tyres.

7.12.9 *Add the following text after the second paragraph:*

Instead of hard copy, electronic form can be used if the following conditions are met:

– instructions for unpacking, installation and enabling access to the complete safety instructions on a suitable reading device shall be provided on paper or marked on the machine,

– the suitable reading device shall be provided with the machine or be necessary to operate the machine, and

– the content of the electronic instructions shall be provided with the machine.

For non-safety related functional use, the operational manual may be provided in electronic form:

– on a suitable electronic display incorporated in the appliance, or

– on a separate electronic device provided with the appliance, or

– from a provided link to a website, where they may be viewed and/or downloaded.

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 Only use the brushes provided with the appliance or those specified in the instructions. The use of other brushes may impair safety.

– WARNING This machine is for dry use only.

– WARNING Do not inhale exhaust gas fumes. Only use indoors when adequate ventilation is provided, and when a second person has been instructed to look after you.

– 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 non-frame connected pole of the battery or by an equivalent method (disconnecting device);
  - for internal combustion engine powered machines with a battery starter, by disconnecting the battery.

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 or pads.

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.

Instructions for internal combustion engine powered machines using LPG shall also include the substance of the following:

– WARNING Machines shall be parked safely.

– The machine shall be inspected by a qualified person regularly, in particular regarding the LPG container and their connections, as required for safe operation by regional or national regulations.

Compliance is checked by inspection.

7.12.102 Information on noise

NOTE The instructions can provide information on airborne noise emission as indicated in CC.2.7.

7.12.103 Information on vibration

NOTE The instructions can provide information on vibration emission as indicated in Clause DD.2.

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.

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.

8.1.1 *Add the following text after the sixth paragraph:*

NOTE Appliances according to this standard are not regarded as being intended to be installed in an area open to the public.

9 Starting of motor-operated appliances

This clause of Part 1 is replaced by the following.

It shall only be possible to start the machine by intended actuation of a control device provided for the purpose. The same requirement applies when restarting the machine after a stoppage, whatever the cause. This requirement only applies to components where the unexpected starting might cause a hazard. It does not apply to components such as suction units, pumps, etc.

Compliance is checked by inspection and test.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.4 Not applicable.

11.6 Not applicable.

11.7 *Addition:*

Machines are operated until steady conditions are established.

11.8 *Add the following to Table 3, at the end of footnote a.*

Motors which are hermetically sealed are considered to be airtight.

~~**12 Void**~~

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

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:*

*Wet cleaning machines, except shampooing machines, are operated for 10 min with to and from movements over a distance of 1 m at 15 cycles per minute on a floor of paving slabs with a smooth surface that are fastened to the bottom of a tray. At the beginning of the test, the tray is filled with the **test solution** to a level of approximately 5 mm above the surface of the floor.*

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 **hand-held appliances** and unstable machines

does not affect their electrical insulation.

Tanks for the following liquids are excluded from the tests:

– hydraulic oil,
– coolant,
– fuel (diesel, gasoline, LPG).

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 % non-ionic 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.~~

– viscosity, 17 mPa s;
– pH 2,2 (1 % in water)
– and its composition shall comprise the following substances

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

Hand-held appliances *and machines that 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.*

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 ± 6) %.

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[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 the product named.

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 60529:1989, as amended by IEC 60529:1989/AMD2:2013 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 floor treatment machine for 15 min, if applicable; and*
– *connected to the floor treatment machine until the machine 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 a saline solution of 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.

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 with appliance outlets complying with the standard sheets in IEC 60320-3 and socket outlets are subjected to the test of 19.101.

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.

19.5 *Modification:*

In the fourth paragraph, delete the following text:

"used in a system with polarized plugs intended for connection to polarized socket outlets"

19.7 *Addition:*

Brushes and fans are not regarded as parts liable to get blocked.

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

19.9 Not applicable.

19.10 *Addition:*

For this test, the lowest possible load is obtained either by lifting the brushes from the floor or in case of machines fitted with a clutch drive that disengages the drive to the brushes, by disengaging the clutch. For machines that include suction equipment, the inlet shall be closed.

19.13 *Modification*:

In the second paragraph, add "and 22.103" *after* "20.2".

19.101 *Machines with appliance outlets, complying with the standard sheets in IEC 60320-3 and socket outlets shall be operated under conditions of* ***normal operation****, except the appliance outlet or socket outlet is loaded with the maximum load corresponding to its configuration in accordance with IEC 60320-3 or IEC TR 60083, respectively. Machines with more than one appliance outlet or socket outlet are tested with each outlet loaded one at the time.*

However, this test is not applied for machines with appliance outlets or socket outlets

– *intended only to supply accessories supplied with the machine;*

– *inaccessible to the user; or*
– *provided with a **protective device** as specified in 22.61.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *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.

Add the following Note after the second paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public.

20.101 Machines shall be provided with an **OPC**.

Compliance is checked by inspection and functional test.

20.102 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) 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, by measurement and by functional test.

20.103 Fuel tank

If a fuel tank is within or contiguous to the engine compartment and excessively high temperatures may occur, the tank and/or filling arrangement shall be isolated from the electrical and exhaust systems by suitable protection, e.g. a separate enclosure or baffles.

The tank location and facilities for filling shall be such that spillage or leakage will not drain onto electrical or exhaust system parts.

Fuel spillage shall not be possible under **normal operation**.

Compliance is checked by inspection.

20.104 Internal combustion engine powered machines using liquefied petroleum gas

Internal combustion engine powered machines using liquefied petroleum gas (LPG) shall be constructed in accordance with the additional requirements specified in normative Annex BB. Requirements for the LPG container itself are not part of this standard.

Compliance is checked by inspection and measurement.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Replacement of the first paragraph by the following text:*

Machines and their components and fittings shall have adequate mechanical strength and be constructed to withstand such rough handling that 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 J ± 0,04 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 subject to impact would cause a failure to comply with this specification, any spot of the machine that 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 ± 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 ± 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 can 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.

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~~ revolutions 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 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:*

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 subjected to the hammer test of 21.1. If this insulation does not meet the requirement of 29.3, these are subjected to the following impact test.

*A sample of the covered part is conditioned at a temperature of 70 °C ± 2 °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 °C ± 2 °C.

While still at this temperature, the sample is then subjected to impact by means of the apparatus shown in Figure 101. The weight "A", having a mass of 0,3 kg, falls from a height of 350 mm on to the chisel "B" of hardened steel, the edge of which is placed on the sample.

*One impact is applied to each place where the insulation is likely to be weak or damaged in **normal operation**, the distance between the points of impact being at least 10 mm.*

After this test it shall show that the insulation has not peeled off and an electric strength test as specified in 16.3 is made between metal parts and metal foil wrapped round the insulation in the required area.

22.54 This subclause is not applicable.

22.61 *Add the following at the end:*

The **protective device** is not necessary for appliances for which 30.2.2 is applicable, fitted with a supply cord or cord set, having a plug of the identical maximum current rating as the socket-outlet or appliance outlet integrated into the appliance.

22.101 Machines shall be constructed so as to prevent the penetration of objects from the floor, which may impair the safety of the machine.

Live parts of machines for wet use shall be at least 30 mm distance from the surface of the floor, measured in vertical direction through existing holes. This requirement does not apply to **motorized cleaning heads**.

Compliance is checked by inspection and measurements.

22.102 Class I appliances and **class II appliances** shall be equipped with a mains isolating switch that ensures **all-pole disconnection** according to overvoltage category III conditions.

For built-in battery chargers, this **all-pole disconnection** can be realised by pulling the plug.

Other switches may be of single pole construction.

The following circuits need not be disconnected by the supply disconnecting device:

– plug and socket-outlets;
– undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure;
– phase rotating indicators;
– control circuits for interlocking.

It is recommended, however, that such circuits be provided with their own disconnecting device.

Compliance is checked by inspection.

22.103 Machines with batteries shall be designed in such a way that electrolyte leakage from the battery does not impair compliance with this standard; in particular there shall be no trace of electrolyte on insulation that reduces **clearances** or **creepage distances** below the values specified in Clause 29.

The battery housing shall be designed and constructed in such a way as to prevent the electrolyte being ejected on to the **operator** and to avoid the accumulation of vapours in places occupied by **operators**.

Compliance is checked by inspection and measurement.

22.104 When split rims are used with pneumatic tyres, the machine shall be provided with devices to prevent the user from separating the rims of the wheel before removing the wheel from the axle, e.g. by welded nuts or screws removable with the aid of a special **tool** only.

Compliance is checked by inspection.

22.105 Guards

Fixed **guards** shall be secured by systems that can be opened or removed only with **tools**, and shall be incapable of remaining in place without their fixings, if applicable.

Their fixing systems shall remain attached to the **guards** or to the machine when the **guards** are removed, with the exception of fixing systems that can remain detachable without impairing safety. This does also not apply if, after removal of the fixing systems, or if the component is incorrectly repositioned, the machine becomes inoperative or is obviously incomplete.

NOTE This requirement does not necessarily apply to fixed **guards** that are only liable to be removed, for example, when the machine is completely overhauled, is subject to major repairs or is dismantled for transfer to another site. This requirement does also not necessarily apply to the casings of machines intended to be used by

laymen, where the manufacturer's instructions specify that the repairs requiring removal of these casings are only to be carried out in a specialist repair workshop. In that case, fixing systems can be used that are not easy to remove.

If movable **guards** are interlocked, the interlocking devices shall prevent the start of hazardous machine functions until the **guards** are fixed in their position, and give a stop command whenever they are no longer closed.

Interlocking movable **guards** shall, as far as possible, remain attached to the machine when open and they shall be designed and constructed in such a way that they can be adjusted only by means of an intentional action.

Interlocking movable **guards** ~~must~~ shall be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous functions of the machine.

Adjustable **guards** may be used only to restrict access to those areas of the moving parts strictly necessary for the work. They shall be manually or automatically adjustable based on the type of work involved and shall be adjustable without the aid of a **tool**.

Compliance is checked by inspection.

22.106 Machines shall be designed in such a way to avoid incorrect mounting, if this can lead to an unsafe situation. If this is not possible, information on the correct mounting shall be given directly on the part and/or the enclosure.

Compliance is checked by inspection.

22.107 Machines, except **hand-held appliances**, shall be constructed so that they can be adapted to the **operator**'s physical dimensions.

Compliance is checked by inspection and by functional test.

22.108 For machines where the **operator** is required to use personal protective equipment (PPE), controls shall be designed in such a way that they can be operated safely.

Compliance is checked by inspection and by functional test.

22.109 On machines with combustion engines, the engine exhaust shall not be directed towards the **operator**.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

*The **OPC** shall be tested for 50 000 cycles of operation.*

24.101 Machines with motors provided with **self-resetting thermal cut-outs** shall work reliably under overvoltage conditions.

Compliance is checked by the following test.

*The machine is supplied at a voltage equal to 1,1 times **rated voltage**, under locked rotor conditions so as to cause the **thermal cut-out** to operate within a few minutes, until the **thermal cut-out** has performed 200 cycles of operation.*

After the test, the machine shall withstand the tests of Clause 16.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Addition:*

Machines classified as IPX7 shall not be provided with an appliance inlet.

Machines classified as IPX4, IPX5 or IPX6 shall not be provided with an appliance inlet, unless both inlet and connector have the same classification as the machine when coupled or separated, or unless inlet and connector can only be separated by the use of a **tool** and have the same classification as the machine when coupled.

Machines provided with an appliance inlet shall also be provided with an appropriate cord set.

25.7 *Replacement:*

Supply cords shall be one of the following types:

– Polychloroprene sheathed

  Their properties shall be at least those of ordinary polychloroprene sheathed cords (code designation 60245 IEC 57);

  NOTE 101 Ordinary tough rubber-sheathed flexible cord (60245 IEC 53) is not suitable for this type of machines due to the influence by chemicals commonly used.

– Polyvinyl chloride sheathed

  These cords shall not be used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of Clause 11. Their properties shall be at least those of ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53);

– Heat-resistant polyvinyl chloride sheathed

  These cords shall not be used for **type X attachment** other than specially prepared cords. Their properties shall be at least those of heat-resistant polyvinyl chloride sheathed cord (code designation 60227 IEC 57).

– Halogen-free, low smoke, thermoplastic insulated and sheathed
  Their properties should at least be those of ordinary duty halogen-free, low smoke flexible cable (code designation 62821 IEC 102 for circular cable).

Compliance is checked by inspection.

25.14 *Addition:*

*For machines incorporating a **type X attachment** or **type Y attachment**, the number of flexings is 20 000.*

25.15 *Modification:*

Replace Table 12 by the following:

Table 12 – Pull force and torque

Mass of machine *kg*	***Pull force*** *N*	***Torque*** *Nm*
≤ 1	*30*	*0,1*
> 1 and ≤ 4	*60*	*0,25*
> 4	*125*	*0,40*

Addition:

The test is also applied to the cord in the cord set for machines classified as IPX4 or higher that are provided with an appliance inlet. The cord set is fitted to the appliance inlet prior to the commencement of the test.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution due to normal use of the machine.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Addition:*

For parts of machines containing rechargeable batteries that can be charged from the mains supply, 30.2.3 is applicable (see normative Annex B). For other machines, 30.2.2 is applicable.

30.2.2 *Addition before the Note ~~6~~:*

The glow-wire test of IEC 60695-2-11 is not applicable to **OPC**-controlled circuits.

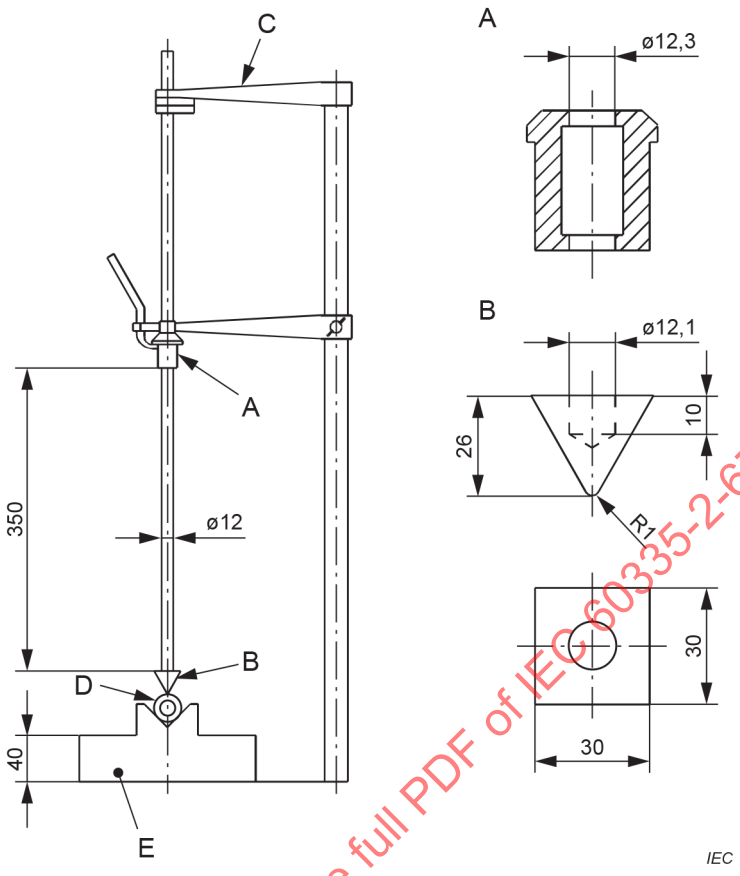
31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

Dimensions in millimetres



Key

A weight

B chisel

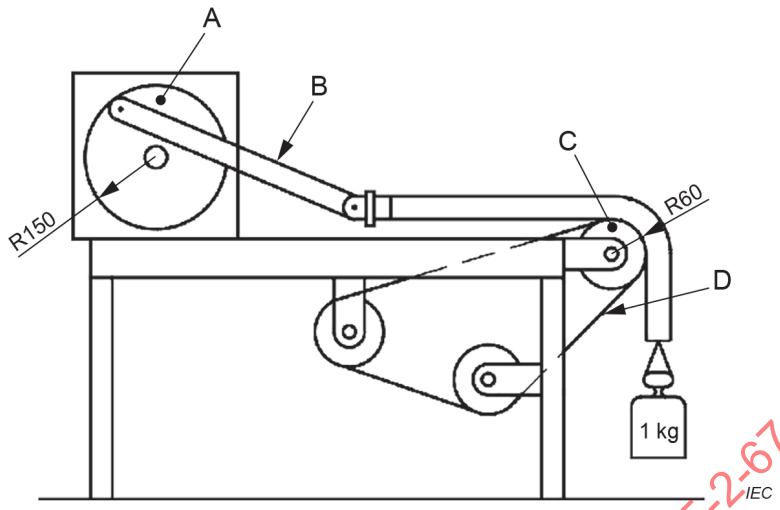
C fixing arm

D sample

E base having mass of 10 kg

Figure 101 – Impact test apparatus

Dimensions in millimetres



Key

A crank mechanism

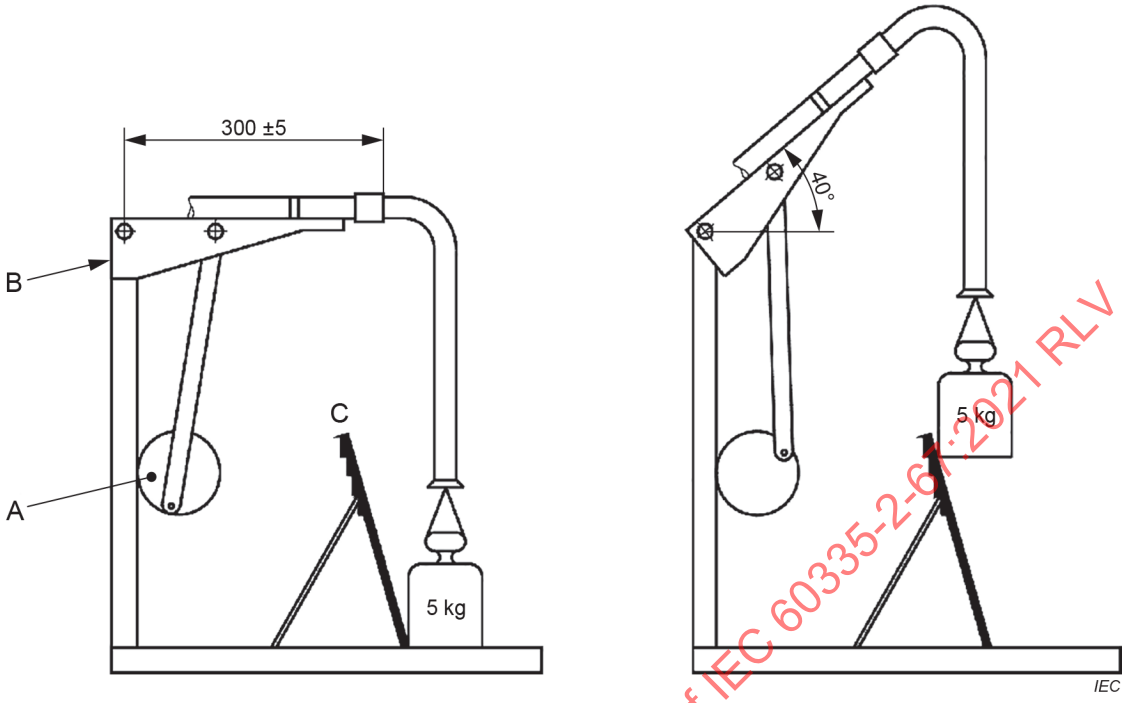
B connecting rod

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

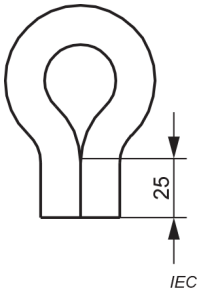


Figure 104 – Configuration of the hose for the freezing treatment

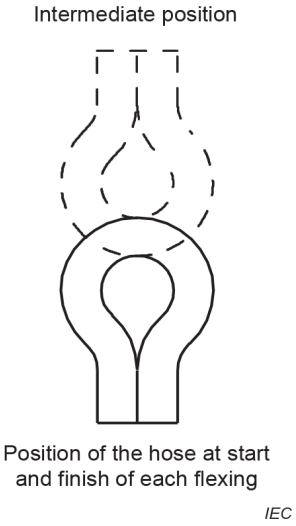


Figure 105 – Flexing positions for the hose after removal from the freezing cabinet

Figure 106 – Warning symbol: Do not inhale exhaust fumes

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

Appliances powered by rechargeable batteries that are recharged in the appliance

Annex B of Part 1 is applicable except as follows.

7 Marking and instructions

7.1 *Delete the last paragraph.*

7.12 *Replace the last two paragraphs by:*

For machines intending to be supplied from a **detachable supply unit** or a battery charger for the purposes of recharging the battery, the type reference of the **detachable supply unit** or battery charger shall be stated.

7.15 *Delete the last paragraph.*

Annex B
(normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

Annex B of Part 1 is applicable except as follows:

7 Marking and instructions

7.1 *Modification:*

Add at the end of the fourth paragraph ("If appliances use more than one battery"):, except for machines with hardwired **battery** sets."

19 Abnormal operation

B.19.2 *Addition:*

This clause is not applicable for machines with hardwired **battery** sets.

22 Construction

B.22.3 *Modification:*

Add the following text after the sixth paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public

B.22.4 *Modification:*

Add the following text after the fifth paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public

~~Annex S~~
~~(normative)~~

~~Battery-operated appliances powered by batteries that are non-rechargeable or not recharged in the appliance~~

~~Annex S of Part 1 is applicable except as follows.~~

~~7 Marking and instructions~~

~~**7.1** *Delete the last sentence, Note 1 and, at the end of the annex, Figure S.1.*~~

~~*Renumber "Note 2" to "Note".*~~

~~19 Abnormal operation~~

~~**19.S.102** This clause is not applicable for machines with hardwired battery sets.~~

Annex AA
(normative)

Precast paving slabs

The cement in the manufacturing of these paving slabs shall be of or similar to one of the following:

– Portland cement (ordinary or rapid hardening);
– Portland blast furnace cement.

The fine and coarse aggregates shall consist of either natural occurring materials, crushed or uncrushed, or alternatively of coarse aggregate to meet the following requirements:

– 10 % fines test: not less than 10 tons;
– flakiness index: not more than 35 %.

The normal maximum size of the aggregate shall not exceed 14 mm.

The total sulphate content of the concrete mix shall not exceed 4,0 % as SO3 by weight of the cement. The sulphate of the cement shall be calculated from the known sulphate contents of the cement, aggregates (where applicable) and pulverised fuel ash, as determined by tests.

The slabs may be made by any process. The escape of the finer particles of mortar during the process of manufacture shall be prevented as far as practicable. A slab described as "pressed" shall only be made by employing a pressure of not less than 7 MN/m^2 over the entire surface.

After casting, the slabs shall be stored so as to prevent undue loss of moisture particularly during the early stages of curing.

Slabs shall be manufactured to the following size: 65 mm × 600 mm × 750 mm.

The maximum deviation from a 750 mm straight edge placed in any position on the wearing surface shall not exceed 2 mm.

There shall be no special preparation for smoothing of the test surface. The slab should be made under normal production conditions for **commercial use**.

Annex BB
(normative)

Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG)

BB.1 Containers

BB.1.1 General

Containers for LPG shall be either permanently fixed on the machine or removable.

Pipe fittings and accessories on containers shall be protected against mechanical damage when used as specified by the manufacturer.

The fuel take-off on the container shall be equipped with an easily and quickly accessible manually operated valve. The position and method of operation of this valve shall be clearly marked on the outside of the machine, near the valve or on each removable container.

It shall be mechanically ensured that the fuel take-off is in a liquid form unless the container and engine are specially equipped for a direct vapour withdrawal. In this case, the direct vapour withdrawal shall also be mechanically ensured.

If containers are installed in a compartment, this compartment shall have permanent openings at the bottom. The total surface area of these ventilation openings shall be at least 200 cm^2 allowing adequate ventilation to the outside atmosphere and without risk to the **operator**.

Containers shall be positioned in such a way that they are not exposed to the damaging effects of heat, particularly heat from the engine and the exhaust system. This requirement is deemed to be met if the distance between the container and the exhaust system is at least 300 mm or if a suitable heat shield is fitted which shall not inhibit ventilation under any circumstances.

Containers shall be fitted on the machine in such a way that they are not unduly exposed to abrasion or shock nor to the corrosive action of the products handled by the machine.

Containers and their connections shall be installed in such a way that there are no projections outside the plan view outline of the machine.

If an additional container is carried on the machine, it shall be secured in the same manner as the main container.

BB.1.2 Containers to be filled by the user

Containers to be filled by the user shall have the following fitted.

– A safety pressure relief valve shall be connected to the vapour space of the container. Where such containers are fitted inside compartments of machines, the discharge side of the relief valve shall be piped to atmosphere. The gas shall be led away safely outside of the motor compartment.

– Containers shall not be possible to be filled more than 80 % of the container capacity. Where containers are fitted inside compartments of machines, the discharge side of any maximum level indicating device which relies on bleeding gas to atmosphere shall terminate at a readily visible position on the outside of the machine.

– Maximum level indicating devices which rely on bleeding to atmosphere shall be designed so that the bleed hole is not larger than 1,5 mm in diameter and also so that the parts of the device cannot be completely withdrawn in normal gauging operations.
– Maximum liquid level devices shall be suitable for the LPG in use, indicate the maximum product level and shall not vent to atmosphere.

BB.1.3 Removable containers

Removable containers shall be secured on the machine in such a way that only intentional release is possible.

When containers are removable, their fastenings shall permit easy handling and checking of the installation after the exchange of containers.

Removable containers which incorporate a safety pressure relief valve shall be so positioned on the machine that the safety pressure relief valve opening is always in communication with the vapour space at the top of the container. This may be accomplished by an indexing pin which positions the container when the container is properly installed.

BB.2 LPG piping

Connecting piping and all associated parts shall be easily accessible, protected against damage and wear, and flexible enough to withstand vibration and deformation in service, as follows.

– Piping shall be so arranged that damage or leaks are easily detectable.
– Piping shall be installed in such a way that it cannot be damaged by the hot parts of the engine or the exhaust system.
– Fully rigid pipes shall not be used for connecting the container to equipment on the engine.

Pressure flexible hoses above 0,1 MPa shall be supported at least every 500 mm. Rigid pipes shall be supported at least every 600 mm.

Hoses, pipes and all connections operating at pressures above 0,1 MPa shall be suitable for a working pressure of 2,4 MPa and shall withstand without bursting a test pressure of 7,5 MPa. Hoses, pipes and all connections operating below 0,1 MPa shall withstand without bursting a test pressure of five times the maximum pressure likely to be encountered in service.

Excessive pressure shall be avoided in any section of pipe work containing LPG in liquid form between two shut-off valves which may be closed; e. g. a pressure relief valve or other suitable means may be used if necessary. The gas shall be led away safely outside of the motor compartment.

Aluminium piping shall not be used in LPG lines.

Hose lengths shall be as short as practical.

Pressure unions and joints above 0,1 MPa shall be made of metal except for any constrained sealing washers.

BB.3 Equipment

The supply of gas shall be automatically cut off when the engine stops irrespective of whether or not the ignition system has been switched off.

For multi-fuel applications, the system shall be designed to avoid the possibility of LPG entering any other fuel container, and to shut off each fuel source before the alternative one is opened.

If the machine is equipped with two or more containers to supply fuel, they shall be connected via a multiway valve, or other suitable means, so that LPG can only be drawn from one container at a time. The use of two or more containers at the same time shall not be possible.

Safety pressure relief valves or liquid level indicators shall be installed in such a way that they cannot discharge in the direction of the **operator** or onto machine components which may be a source of ignition.

All fuel system components shall be firmly secured to the machine.

Pressure reducing valves shall be readily accessible for inspection and maintenance.

Annex CC
(informative)

Emission of acoustical noise

CC.1 Noise reduction

Noise reduction at floor-treatment machines is an integral part of the design process and can be achieved by applying measures at source to control noise, see for example ISO/TR 11688-1. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values in relation to other machines of the same type with comparable non-acoustical technical data.

The major sound sources in floor-treatment machines are: motors, fan, brushes, pads.

CC.2 Noise test code

CC.2.1 Emission sound pressure level determination

The emission sound pressure level is measured in accordance with ISO 11201, grade 2.

The microphone is placed at a distance of 0,40 m ± 0,025 m behind the handle at a height of 1,55 m ± 0,075 m and directed towards to the geometrical center of the machine. The handle shall be positioned according to normal use as specified in the instructions for use.

CC.2.2 Sound power level determination

The sound power level is measured in accordance with ISO 3744, or with ISO 3743-1 if a suitable hard-walled test room is available, or with ISO 9614-2. The handle of the machine has to face towards the opposite direction of the x-axis defined for the microphone configurations in ISO 3744.

CC.2.3 Operating conditions

The operating condition shall be identical for the determination for both sound power and emission sound pressure level at the specified positions.

The machines shall be tested in a stationary position. The engine respective motors and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment. The machine shall be placed on a surface in accordance with 3.1.9.101 to 3.1.9.103 as applicable. The cleaning head operates at its highest speed; it is in contact with the ground. The suction system (if applicable) operates at its maximum suction power with the distance between ground and mouth of the suction system not exceeding 25 mm. The measurement time shall be at least 15 s after the machine had been operated for at least 10 min.

CC.2.4 Measurement uncertainties

A standard deviation of reproducibility σ_{RO} of less than 1,5 dB is expected for the A-weighted sound power level determined according to ISO 3744 and the A-weighted emission sound pressure level determined according to ISO 11201, grade 2.

CC.2.5 Information to be recorded

The information to be recorded covers all of the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.

CC.2.6 Information to be reported

The information to be included in the test report is at least that which the manufacturer requires for a noise emission declaration or the user requires to verify the declared values.

CC.2.7 Declaration and verification of noise emission values

The declaration of the emission sound pressure level shall be made as a dual-number noise emission declaration and shall declare the noise emission value L_{pA} and the respective uncertainty K_{pA}. The emission value shall be given where it exceeds 70 dB(A). Where this value does not exceed 70 dB(A), this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $L_{pA} \leq 70$ dB(A).

The sound power level shall be given as a dual-number noise emission declaration, where the emission sound pressure level exceeds 80 dB(A). It shall declare the emission value L_{WA} and separately the respective uncertainty K_{WA}.

For both, the declaration of the emission sound pressure level and the sound power level, the uncertainty K_{pA} and K_{WA} shall be calculated in accordance with ISO 4871.

Alternatively, if a minimum sample size of $n = 5$ is measured with at least 9 microphones simultaneously, both the uncertainty K_{pA} and K_{WA} may be determined as follows if measurement is done with enhanced accuracy at an ambient temperature of 20 C ± 10 C.

NOTE 1 Where the uncertainty is not calculated in accordance with the given standards or procedure, K_{pA} and K_{WA} are usually expected to be 3 dB.

$$K_{pA} = K_{WA} = 1{,}5 \cdot \sigma_t$$

with

– the total standard deviation $\sigma_t = \sqrt{\sigma_R^2 + \sigma_P^2}$,

– the standard deviation of reproducibility $\sigma_R = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2}$,

– and the standard deviation of production σ_P which has to be assumed for later (mass-)production.

Values for σ_R may be estimated to σ_R = 0,5 dB, if the environment correction K_2 (according to ISO 11201 and ISO 3744, see CC.2.1 and CC.2.2) is determined using a calibrated reference sound source (measurement and correction) with a value of not more than 0,4 dB.

NOTE 2 If K_2 is more than 0,4 dB, a value of σ_R = 0,5 dB as proposed here cannot be achieved. Correction of K_2 needs a lot of experience and comparison-measurements at optimal conditions.

The value for σ_P shall be calculated individually from the measurement results of at least the first 5 machines produced after determination of s_p for a sample size of $n \geq 5$ machines. Because the production variation may change under later production conditions, it is recommended to calculate σ_P as follows:

$$\sigma_P = SF \times s_p$$

The necessary size of the safety factor SF depends on the relation between s_p and σ_R as well as on the sample size n as shown in Table CC.1.

Table CC.1 – Determination of uncertainty

n	$s_p \leq \sigma_R$	$s_p > \sigma_R$
5 to 7	1,3	1,5
8 to 12	1,2	1,3
13 to 19	1,0	1,1
≥ 20	1,0	1,0

The noise declaration shall state that the noise emission values have been obtained according to the given standard or procedure. The noise declaration shall indicate clearly which standard or procedure was used regarding measurement as well as statistical calculation.

If undertaken, verification shall be conducted according to ISO 4871 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission values.

Annex DD
(informative)

Emission of vibration

DD.1 Reduction of vibration

The machine shall be designed and constructed in such a way that risks resulting from vibrations produced by the machine are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.

The handles shall be designed and constructed in such a way as to reduce the vibrations transmitted to the upper limbs of the **operator** to the lowest level that is reasonably possible.

DD.2 Information on vibration emission

The instructions shall give the following information:

– the vibration total value to which the hand-arm system is subjected, measured in accordance with ISO 5349-1 for arm vibrations, the machine being supplied at **rated power input** or at the maximum **rated power input** for machines with a range of power, if the vibration total value exceeds 2,5 m/s^2. Where this value does not exceed 2,5 m/s^2, this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $a_h \leq 2{,}5$ m/s^2;

– the uncertainty surrounding these values in accordance with the above given standards.

These values shall be either those actually measured for the machine in question or those established on the basis of measurements taken for a technically comparable machine which is representative of the machine being produced.

Regarding operating conditions during measurement and the methods used for measurement, the reference of the standard applied (IEC 60335-2-67) shall be specified.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

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

IEC 60335-2-10, *Household and similar electrical appliances – Safety – Part 2-10: Particular requirements for floor treatment machines and wet scrubbing machines*

IEC 60335-2-68, *Household and similar electrical appliances – Safety – Part 2-68: Particular requirements for spray extraction appliances, for commercial use*

IEC 60335-2-69, *Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use*

IEC 60335-2-72, *Household and similar electrical appliances – Safety – Part 2-72: Particular requirements for floor treatment machines with or without traction drive, for commercial use*

~~IEC 60745 (all parts), *Hand-held motor-operated electric tools*~~

~~IEC 61029 (all parts), *Safety of transportable motor-operated electric tools*~~

~~IEC 62841 (all parts), *Electric motor-operated hand-held, transportable tools and lawn and garden machinery – Safety*~~

ISO 3743-1, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for small movable sources in reverberant fields – Part 1: Comparison method for a hard-walled test room*

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 4871, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 5349-1, *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 1: General requirements*

ISO 9614-2, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning*

ISO 11201, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO/TR 11688-1, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning*

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Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment machines, for commercial use

Appareils électrodomestiques et analogues – Sécurité – Partie 2-67: Exigences particulières pour les machines de traitement des sols, à usage commercial

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-67: Particular requirements for floor treatment machines, for commercial use

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60335-2-67 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. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2012 and its Amendment 1: 2016. It constitutes a technical revision.

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

– editorial and technical alignment with IEC 60335-1:2020.

The text of this International Standard is based on the following documents:

CDV	Report on voting
61J/735/CDV	61J/742A/RVC

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

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

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

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 sixth edition (2020) 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: Particular requirements for floor treatment machines, 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.

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.

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 this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

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

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

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 2-67: Particular requirements for floor treatment machines, for commercial use

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of powered floor treatment machines intended for commercial indoor or outdoor use for the following applications:

– scrubbing,
– wet or dry pick-up,
– polishing and dry buffing,
– application of wax, sealing products and powder based detergents,
– shampooing,
– stripping, grinding and scarifying

of floors with an artificial surface.

These machines have a cleaning motion which is more lateral or periodic than linear.

NOTE 101 By contrast, the cleaning motion of machines covered by IEC 60335-2-72 is more linear than lateral or periodic.

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.

These machines are not equipped with a **traction drive**.

NOTE 103 Machines for the same intended function but equipped with a traction drive are covered by IEC 60335-2-72.

The following power systems are covered:

– internal combustion engines,
– mains powered motors up to a **rated voltage** of 250 V for single-phase appliances and 480 V for other appliances,
– **battery-operated machines**.

Battery-operated machines may be equipped with a built-in battery charger.

This standard does not apply to

– vacuum cleaners and water-suction cleaning appliances for household use (IEC 60335-2-2);

– floor treatment appliances for household use (IEC 60335-2-10);
– spray extraction machines for **commercial use** (IEC 60335-2-68);
– wet and dry vacuum cleaners, including power brush, for **commercial use** (IEC 60335-2-69);

NOTE 104 IEC 60335-2-68 and IEC 60335-2-69 cover only machines without traction drive.

– floor treatment machines with or without **traction drive**, for **commercial use** (IEC 60335-2-72);
– hand-held and transportable motor-operated electric **tools** (IEC 60745 series, IEC 61029 series, IEC 62841 series);
– machines designed for use in corrosive or explosive environments (dust, vapour or gas);
– machines designed for picking up hazardous dusts (as defined in IEC 60335-2-69), inflammable substances, or glowing particles;
– machines designed for use in vehicles or on board of ships or aircraft.

NOTE 105 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 TS 62885-1, *Surface cleaning appliances – Part 1: General requirements on test material and test equipment*

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Addition:*
normal operation
conditions under which the machine is operated in normal use, as intended by the manufacturer

It denotes the load corresponding to the **rated power input** or the highest obtainable load of all particular loads of the various functions that can be operated at the same time according to the manufacturer's instructions.

Tanks of machines, if applicable, are filled before starting the operation to the highest level as indicated on the tank, or completely if no marking is provided.

Suction functions, if applicable, are switched on during operation.

The **normal operation** related to the operational functions is specified in 3.1.9.101 to 3.1.9.103.

3.1.9.101 Scrubbing, stripping, grinding and scarifying machines are operated with the appropriate brushes or pads on a surface of hydraulically pressed concrete paving slabs (see normative Annex AA).

An alternative is a smooth concrete area of a surface consistency comparable with hydraulically pressed concrete paving slabs.

3.1.9.102 Polishing and dry buffing machines are operated as follows.

PVC or comparable surfaces are considered to be suitable for establishing **normal operation**. The peak of input occurring during the drying process of the chemical applied to treat the surface is not taken as **normal operation** but is averaged by extending measurements over a period of at least 10 min.

3.1.9.103 Carpet shampooers are operated on a test surface consisting of a carpet, in accordance with IEC TS 62885-1, the carpet being fastened to the floor.

Prior to testing, the brush of the shampooing machine is conditioned by operating it for 15 min on a clean, dry concrete surface. After running on the concrete surface the brush is immersed in a shampoo solution for at least 30 min.

3.101
water-suction cleaning machine
machine for applying and sucking up a water-based cleaning solution

3.102
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**.

3.103
traction drive
system used to propel the machine, e.g. by powered wheels

Note 1 to entry: Traction by the effect of rotating brushes is not included.

3.104
operator presence control
OPC
control device that automatically interrupts the power, e.g. to a drive or an engine, when the **operator**'s actuating force is removed

Note 1 to entry: Such devices can be, for example, continuous action controls ("hold-to-run" controls).

3.105
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 movable **guards** are required where frequent access is envisaged, while fixed **guards** can be used where frequent access is not envisaged.

3.106
operator
person installing, operating, adjusting, maintaining, cleaning or moving the machine

3.107
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 $C_{12}H_{25}NaSO_4$.

3.108
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.

4 General requirement

This clause of Part 1 is applicable except as follows.

Replacement of the first paragraph by the following text:

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:*

Machines shall be one of the following classes with respect to the protection against electric shock:

– **class I**,
– **class II**, or
– **class III**.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Mains supplied machines for indoor use and intended for dry cleaning only, shall be at least IPX0. Other machines shall be at least IPX4. Machines for dry use that may be equipped with additional accessories transforming them into machines for wet application shall comply with IPX4 while being equipped with such accessories.

NOTE 101 Machines with detached accessories for wet cleaning can comply with IPX0 for dry cleaning purposes.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Modification:*

Replace the fourth dashed item as follows:

– 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 shall be marked with the mass of the most usual configuration in kg.

Machines intended to be used indoors and powered by internal combustion engines shall be marked with the symbol according to Figure 106. It is acceptable to show this symbol in monochrome colour.

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.

7.6 *Addition:*

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

motorized cleaning head for water-suction cleaning

7.12 *Modification:*

Delete the first paragraph and the first warning.

Add after the Note the following new text:

NOTE 101 Alternative requirements for instructions in hard copy form are available in 7.12.9.

Replacement of the fourth 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 instructions before using the machine.

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

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 spray units, suction units, 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**.

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;

– the intended use of the brushes specified for the machine;

– if split rims are used for pneumatic tyres, instructions shall be given for the safe change of tyres.

7.12.9 *Add the following text after the second paragraph:*

Instead of hard copy, electronic form can be used if the following conditions are met:

– instructions for unpacking, installation and enabling access to the complete safety instructions on a suitable reading device shall be provided on paper or marked on the machine,

– the suitable reading device shall be provided with the machine or be necessary to operate the machine, and

– the content of the electronic instructions shall be provided with the machine.

For non-safety related functional use, the operational manual may be provided in electronic form:

– on a suitable electronic display incorporated in the appliance, or

– on a separate electronic device provided with the appliance, or

– from a provided link to a website, where they may be viewed and/or downloaded.

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 Only use the brushes provided with the appliance or those specified in the instructions. The use of other brushes may impair safety.

– WARNING This machine is for dry use only.

– WARNING Do not inhale exhaust gas fumes. Only use indoors when adequate ventilation is provided, and when a second person has been instructed to look after you.

– 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 non-frame connected pole of the battery or by an equivalent method (disconnecting device);
  - for internal combustion engine powered machines with a battery starter, by disconnecting the battery.

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 or pads.

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.

Instructions for internal combustion engine powered machines using LPG shall also include the substance of the following:

– WARNING Machines shall be parked safely.

– The machine shall be inspected by a qualified person regularly, in particular regarding the LPG container and their connections, as required for safe operation by regional or national regulations.

Compliance is checked by inspection.

7.12.102 Information on noise

NOTE The instructions can provide information on airborne noise emission as indicated in CC.2.7.

7.12.103 Information on vibration

NOTE The instructions can provide information on vibration emission as indicated in Clause DD.2.

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.

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.

8.1.1 *Add the following text after the sixth paragraph:*

NOTE Appliances according to this standard are not regarded as being intended to be installed in an area open to the public.

9 Starting of motor-operated appliances

This clause of Part 1 is replaced by the following.

It shall only be possible to start the machine by intended actuation of a control device provided for the purpose. The same requirement applies when restarting the machine after a stoppage, whatever the cause. This requirement only applies to components where the unexpected starting might cause a hazard. It does not apply to components such as suction units, pumps, etc.

Compliance is checked by inspection and test.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.4 Not applicable.

11.6 Not applicable.

11.7 *Addition:*

Machines are operated until steady conditions are established.

11.8 *Add the following to Table 3, at the end of footnote a.*

Motors which are hermetically sealed are considered to be airtight.

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

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:*

Wet cleaning machines, except shampooing machines, are operated for 10 min with to and from movements over a distance of 1 m at 15 cycles per minute on a floor of paving slabs with a smooth surface that are fastened to the bottom of a tray. At the beginning of the test, the tray is filled with the ***test solution*** *to a level of approximately 5 mm above the surface of the floor.*

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 **hand-held appliances** and unstable machines

does not affect their electrical insulation.

Tanks for the following liquids are excluded from the tests:

– hydraulic oil,
– coolant,
– fuel (diesel, gasoline, LPG).

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 % non-ionic 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 comprise the following substances	
– Plurafac ® LF 221[1]	15,0 % parts by mass
– Cumene sulfonate (40 % solution)	11,5 % parts by mass
– Citric acid (anhydrous)	3,0 % parts by mass
– Deionized water	70,5 % parts by mass

Hand-held appliances *and machines that 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.*

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 ± 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.*

[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 the product named.

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 60529:1989, as amended by IEC 60529:1989/AMD2:2013 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 floor treatment machine for 15 min, if applicable; and*
– *connected to the floor treatment machine until the machine 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 a saline solution of 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.

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 with appliance outlets complying with the standard sheets in IEC 60320-3 and socket outlets are subjected to the test of 19.101.

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.

19.5 *Modification:*

In the fourth paragraph, delete the following text:

"used in a system with polarized plugs intended for connection to polarized socket outlets"

19.7 *Addition:*

Brushes and fans are not regarded as parts liable to get blocked.

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

19.9 Not applicable.

19.10 *Addition:*

For this test, the lowest possible load is obtained either by lifting the brushes from the floor or in case of machines fitted with a clutch drive that disengages the drive to the brushes, by disengaging the clutch. For machines that include suction equipment, the inlet shall be closed.

19.13 *Modification*:

In the second paragraph, add "and 22.103" *after* "20.2".

19.101 *Machines with appliance outlets, complying with the standard sheets in IEC 60320-3 and socket outlets shall be operated under conditions of* ***normal operation****, except the appliance outlet or socket outlet is loaded with the maximum load corresponding to its configuration in accordance with IEC 60320-3 or IEC TR 60083, respectively. Machines with more than one appliance outlet or socket outlet are tested with each outlet loaded one at the time.*

However, this test is not applied for machines with appliance outlets or socket outlets

- *intended only to supply accessories supplied with the machine;*
- *inaccessible to the user; or*
- *provided with a* ***protective device*** *as specified in 22.61.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *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.

Add the following Note after the second paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public.

20.101 Machines shall be provided with an **OPC**.

Compliance is checked by inspection and functional test.

20.102 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) 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, by measurement and by functional test.

20.103 Fuel tank

If a fuel tank is within or contiguous to the engine compartment and excessively high temperatures may occur, the tank and/or filling arrangement shall be isolated from the electrical and exhaust systems by suitable protection, e.g. a separate enclosure or baffles.

The tank location and facilities for filling shall be such that spillage or leakage will not drain onto electrical or exhaust system parts.

Fuel spillage shall not be possible under **normal operation**.

Compliance is checked by inspection.

20.104 Internal combustion engine powered machines using liquefied petroleum gas

Internal combustion engine powered machines using liquefied petroleum gas (LPG) shall be constructed in accordance with the additional requirements specified in normative Annex BB. Requirements for the LPG container itself are not part of this standard.

Compliance is checked by inspection and measurement.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Replacement of the first paragraph by the following text:*

Machines and their components and fittings shall have adequate mechanical strength and be constructed to withstand such rough handling that 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 J ± 0,04 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 subject to impact would cause a failure to comply with this specification, any spot of the machine that 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 ± 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 ± 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 can 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.

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 revolutions 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 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:*

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 subjected to the hammer test of 21.1. If this insulation does not meet the requirement of 29.3, these are subjected to the following impact test.

*A sample of the covered part is conditioned at a temperature of 70 °C ± 2 °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 °C ± 2 °C.

While still at this temperature, the sample is then subjected to impact by means of the apparatus shown in Figure 101. The weight "A", having a mass of 0,3 kg, falls from a height of 350 mm on to the chisel "B" of hardened steel, the edge of which is placed on the sample.

*One impact is applied to each place where the insulation is likely to be weak or damaged in **normal operation**, the distance between the points of impact being at least 10 mm.*

After this test, it shall show that the insulation has not peeled off and an electric strength test as specified in 16.3 is made between metal parts and metal foil wrapped round the insulation in the required area.

22.54 This subclause is not applicable.

22.61 *Add the following at the end:*

The **protective device** is not necessary for appliances for which 30.2.2 is applicable, fitted with a supply cord or cord set, having a plug of the identical maximum current rating as the socket-outlet or appliance outlet integrated into the appliance.

22.101 Machines shall be constructed so as to prevent the penetration of objects from the floor, which may impair the safety of the machine.

Live parts of machines for wet use shall be at least 30 mm distance from the surface of the floor, measured in vertical direction through existing holes. This requirement does not apply to **motorized cleaning heads**.

Compliance is checked by inspection and measurements.

22.102 **Class I appliances** and **class II appliances** shall be equipped with a mains isolating switch that ensures **all-pole disconnection** according to overvoltage category III conditions.

For built-in battery chargers, this **all-pole disconnection** can be realised by pulling the plug.

Other switches may be of single pole construction.

The following circuits need not be disconnected by the supply disconnecting device:

– plug and socket-outlets;
– undervoltage protection circuits that are only provided for automatic tripping in the event of supply failure;
– phase rotating indicators;
– control circuits for interlocking.

It is recommended, however, that such circuits be provided with their own disconnecting device.

Compliance is checked by inspection.

22.103 Machines with batteries shall be designed in such a way that electrolyte leakage from the battery does not impair compliance with this standard; in particular there shall be no trace of electrolyte on insulation that reduces **clearances** or **creepage distances** below the values specified in Clause 29.

The battery housing shall be designed and constructed in such a way as to prevent the electrolyte being ejected on to the **operator** and to avoid the accumulation of vapours in places occupied by **operators**.

Compliance is checked by inspection and measurement.

22.104 When split rims are used with pneumatic tyres, the machine shall be provided with devices to prevent the user from separating the rims of the wheel before removing the wheel from the axle, e.g. by welded nuts or screws removable with the aid of a special **tool** only.

Compliance is checked by inspection.

22.105 Guards

Fixed **guards** shall be secured by systems that can be opened or removed only with **tools**, and shall be incapable of remaining in place without their fixings, if applicable.

Their fixing systems shall remain attached to the **guards** or to the machine when the **guards** are removed, with the exception of fixing systems that can remain detachable without impairing safety. This does also not apply if, after removal of the fixing systems, or if the component is incorrectly repositioned, the machine becomes inoperative or is obviously incomplete.

NOTE This requirement does not necessarily apply to fixed **guards** that are only liable to be removed, for example, when the machine is completely overhauled, is subject to major repairs or is dismantled for transfer to another site. This requirement does also not necessarily apply to the casings of machines intended to be used by laymen, where the manufacturer's instructions specify that the repairs requiring removal of these casings are only to be carried out in a specialist repair workshop. In that case, fixing systems can be used that are not easy to remove.

If movable **guards** are interlocked, the interlocking devices shall prevent the start of hazardous machine functions until the **guards** are fixed in their position, and give a stop command whenever they are no longer closed.

Interlocking movable **guards** shall, as far as possible, remain attached to the machine when open and they shall be designed and constructed in such a way that they can be adjusted only by means of an intentional action.

Interlocking movable **guards** shall be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous functions of the machine.

Adjustable **guards** may be used only to restrict access to those areas of the moving parts strictly necessary for the work. They shall be manually or automatically adjustable based on the type of work involved and shall be adjustable without the aid of a **tool**.

Compliance is checked by inspection.

22.106 Machines shall be designed in such a way to avoid incorrect mounting, if this can lead to an unsafe situation. If this is not possible, information on the correct mounting shall be given directly on the part and/or the enclosure.

Compliance is checked by inspection.

22.107 Machines, except **hand-held appliances**, shall be constructed so that they can be adapted to the **operator**'s physical dimensions.

Compliance is checked by inspection and by functional test.

22.108 For machines where the **operator** is required to use personal protective equipment (PPE), controls shall be designed in such a way that they can be operated safely.

Compliance is checked by inspection and by functional test.

22.109 On machines with combustion engines, the engine exhaust shall not be directed towards the **operator**.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.3 *Addition:*

*The **OPC** shall be tested for 50 000 cycles of operation.*

24.101 Machines with motors provided with **self-resetting thermal cut-outs** shall work reliably under overvoltage conditions.

Compliance is checked by the following test.

*The machine is supplied at a voltage equal to 1,1 times **rated voltage**, under locked rotor conditions so as to cause the **thermal cut-out** to operate within a few minutes, until the **thermal cut-out** has performed 200 cycles of operation.*

After the test, the machine shall withstand the tests of Clause 16.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Addition:*

Machines classified as IPX7 shall not be provided with an appliance inlet.

Machines classified as IPX4, IPX5 or IPX6 shall not be provided with an appliance inlet, unless both inlet and connector have the same classification as the machine when coupled or separated, or unless inlet and connector can only be separated by the use of a **tool** and have the same classification as the machine when coupled.

Machines provided with an appliance inlet shall also be provided with an appropriate cord set.

25.7 *Replacement:*

Supply cords shall be one of the following types:

– Polychloroprene sheathed

  Their properties shall be at least those of ordinary polychloroprene sheathed cords (code designation 60245 IEC 57);

  NOTE 101 Ordinary tough rubber-sheathed flexible cord (60245 IEC 53) is not suitable for this type of machines due to the influence by chemicals commonly used.

– Polyvinyl chloride sheathed

  These cords shall not be used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of Clause 11. Their properties shall be at least those of ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53);

– Heat-resistant polyvinyl chloride sheathed

  These cords shall not be used for **type X attachment** other than specially prepared cords. Their properties shall be at least those of heat-resistant polyvinyl chloride sheathed cord (code designation 60227 IEC 57).

– Halogen-free, low smoke thermoplastic insulated and sheathed
  Their properties should at least be those of ordinary duty halogen-free, low smoke flexible cable (code designation 62821 IEC 102 for circular cable).

Compliance is checked by inspection.

25.14 *Addition:*

*For machines incorporating a **type X attachment** or **type Y attachment**, the number of flexings is 20 000.*

25.15 *Modification:*

Replace Table 12 by the following:

Table 12 – Pull force and torque

Mass of machine *kg*	***Pull force*** *N*	***Torque*** *Nm*
≤ 1	*30*	*0,1*
> 1 and ≤ 4	*60*	*0,25*
> 4	*125*	*0,40*

Addition:

The test is also applied to the cord in the cord set for machines classified as IPX4 or higher that are provided with an appliance inlet. The cord set is fitted to the appliance inlet prior to the commencement of the test.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition:*

The microenvironment is pollution degree 3 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution due to normal use of the machine.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Addition:*

For parts of machines containing rechargeable batteries that can be charged from the mains supply, 30.2.3 is applicable (see normative Annex B). For other machines, 30.2.2 is applicable.

30.2.2 *Addition before the Note:*

The glow-wire test of IEC 60695-2-11 is not applicable to **OPC**-controlled circuits.

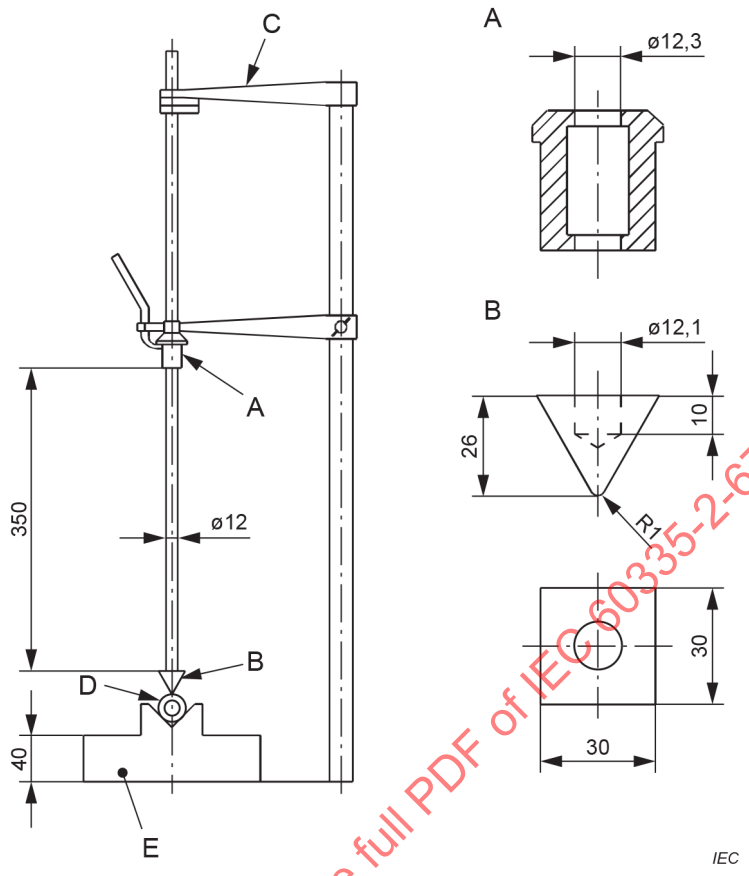
31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

Dimensions in millimetres



Key

A weight

B chisel

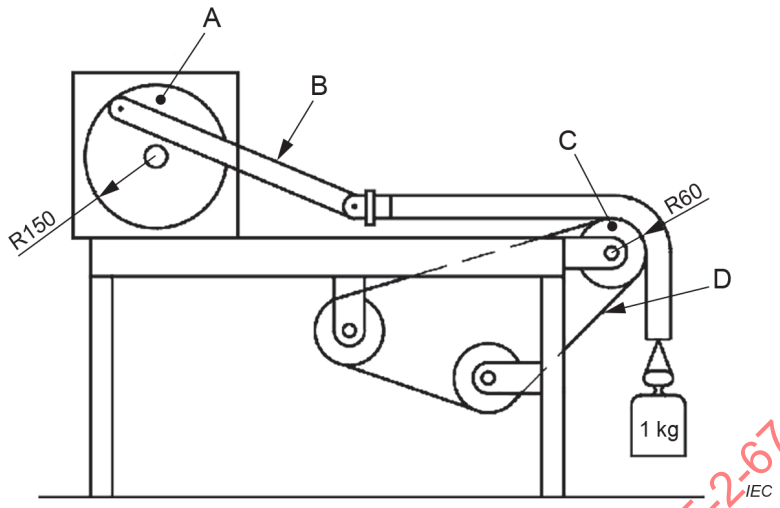
C fixing arm

D sample

E base having mass of 10 kg

Figure 101 – Impact test apparatus

Dimensions in millimetres



Key

A crank mechanism

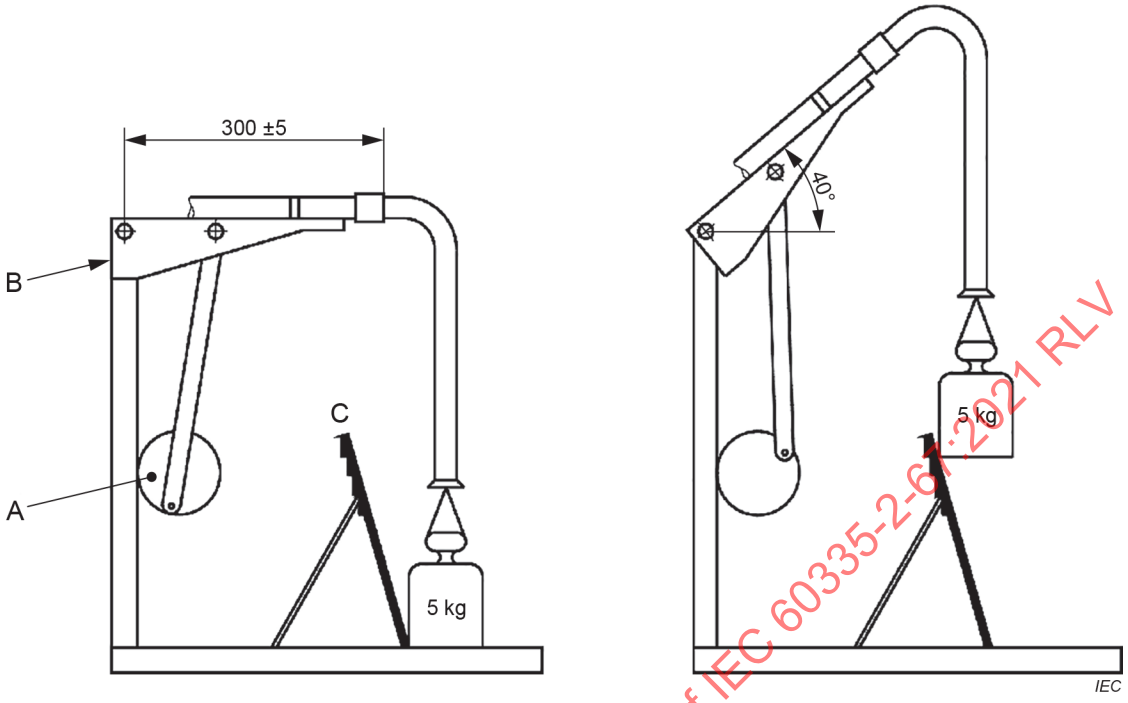
B connecting rod

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

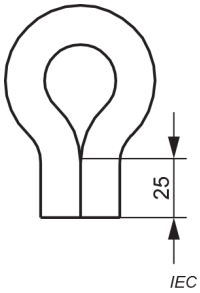


Figure 104 – Configuration of the hose for the freezing treatment

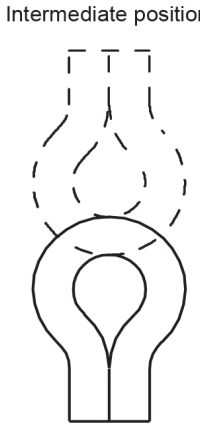


Figure 105 – Flexing positions for the hose after removal from the freezing cabinet

Figure 106 – Warning symbol: Do not inhale exhaust fumes

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances

Annex B of Part 1 is applicable except as follows:

7 Marking and instructions

7.1 *Modification:*

Add at the end of the fourth paragraph ("If appliances use more than one battery"): ", except for machines with hardwired **battery** sets."

19 Abnormal operation

B.19.2 *Addition:*

This clause is not applicable for machines with hardwired **battery** sets.

22 Construction

B.22.3 *Modification:*

Add the following text after the sixth paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public

B.22.4 *Modification:*

Add the following text after the fifth paragraph of the test specification:

NOTE 101 Appliances according to this standard are not regarded as being intended to be installed in an area open to the public

Annex AA
(normative)

Precast paving slabs

The cement in the manufacturing of these paving slabs shall be of or similar to one of the following:

– Portland cement (ordinary or rapid hardening);
– Portland blast furnace cement.

The fine and coarse aggregates shall consist of either natural occurring materials, crushed or uncrushed, or alternatively of coarse aggregate to meet the following requirements:

– 10 % fines test: not less than 10 tons;
– flakiness index: not more than 35 %.

The normal maximum size of the aggregate shall not exceed 14 mm.

The total sulphate content of the concrete mix shall not exceed 4,0 % as SO3 by weight of the cement. The sulphate of the cement shall be calculated from the known sulphate contents of the cement, aggregates (where applicable) and pulverised fuel ash, as determined by tests.

The slabs may be made by any process. The escape of the finer particles of mortar during the process of manufacture shall be prevented as far as practicable. A slab described as "pressed" shall only be made by employing a pressure of not less than 7 MN/m^2 over the entire surface.

After casting, the slabs shall be stored so as to prevent undue loss of moisture particularly during the early stages of curing.

Slabs shall be manufactured to the following size: 65 mm × 600 mm × 750 mm.

The maximum deviation from a 750 mm straight edge placed in any position on the wearing surface shall not exceed 2 mm.

There shall be no special preparation for smoothing of the test surface. The slab should be made under normal production conditions for **commercial use**.

Annex BB
(normative)

Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG)

BB.1 Containers

BB.1.1 General

Containers for LPG shall be either permanently fixed on the machine or removable.

Pipe fittings and accessories on containers shall be protected against mechanical damage when used as specified by the manufacturer.

The fuel take-off on the container shall be equipped with an easily and quickly accessible manually operated valve. The position and method of operation of this valve shall be clearly marked on the outside of the machine, near the valve or on each removable container.

It shall be mechanically ensured that the fuel take-off is in a liquid form unless the container and engine are specially equipped for a direct vapour withdrawal. In this case, the direct vapour withdrawal shall also be mechanically ensured.

If containers are installed in a compartment, this compartment shall have permanent openings at the bottom. The total surface area of these ventilation openings shall be at least 200 cm^2 allowing adequate ventilation to the outside atmosphere and without risk to the **operator**.

Containers shall be positioned in such a way that they are not exposed to the damaging effects of heat, particularly heat from the engine and the exhaust system. This requirement is deemed to be met if the distance between the container and the exhaust system is at least 300 mm or if a suitable heat shield is fitted which shall not inhibit ventilation under any circumstances.

Containers shall be fitted on the machine in such a way that they are not unduly exposed to abrasion or shock nor to the corrosive action of the products handled by the machine.

Containers and their connections shall be installed in such a way that there are no projections outside the plan view outline of the machine.

If an additional container is carried on the machine, it shall be secured in the same manner as the main container.

BB.1.2 Containers to be filled by the user

Containers to be filled by the user shall have the following fitted.

– A safety pressure relief valve shall be connected to the vapour space of the container. Where such containers are fitted inside compartments of machines, the discharge side of the relief valve shall be piped to atmosphere. The gas shall be led away safely outside of the motor compartment.

– Containers shall not be possible to be filled more than 80 % of the container capacity. Where containers are fitted inside compartments of machines, the discharge side of any maximum level indicating device which relies on bleeding gas to atmosphere shall terminate at a readily visible position on the outside of the machine.

– Maximum level indicating devices which rely on bleeding to atmosphere shall be designed so that the bleed hole is not larger than 1,5 mm in diameter and also so that the parts of the device cannot be completely withdrawn in normal gauging operations.
– Maximum liquid level devices shall be suitable for the LPG in use, indicate the maximum product level and shall not vent to atmosphere.

BB.1.3 Removable containers

Removable containers shall be secured on the machine in such a way that only intentional release is possible.

When containers are removable, their fastenings shall permit easy handling and checking of the installation after the exchange of containers.

Removable containers which incorporate a safety pressure relief valve shall be so positioned on the machine that the safety pressure relief valve opening is always in communication with the vapour space at the top of the container. This may be accomplished by an indexing pin which positions the container when the container is properly installed.

BB.2 LPG piping

Connecting piping and all associated parts shall be easily accessible, protected against damage and wear, and flexible enough to withstand vibration and deformation in service, as follows.

– Piping shall be so arranged that damage or leaks are easily detectable.
– Piping shall be installed in such a way that it cannot be damaged by the hot parts of the engine or the exhaust system.
– Fully rigid pipes shall not be used for connecting the container to equipment on the engine.

Pressure flexible hoses above 0,1 MPa shall be supported at least every 500 mm. Rigid pipes shall be supported at least every 600 mm.

Hoses, pipes and all connections operating at pressures above 0,1 MPa shall be suitable for a working pressure of 2,4 MPa and shall withstand without bursting a test pressure of 7,5 MPa. Hoses, pipes and all connections operating below 0,1 MPa shall withstand without bursting a test pressure of five times the maximum pressure likely to be encountered in service.

Excessive pressure shall be avoided in any section of pipe work containing LPG in liquid form between two shut-off valves which may be closed; e. g. a pressure relief valve or other suitable means may be used if necessary. The gas shall be led away safely outside of the motor compartment.

Aluminium piping shall not be used in LPG lines.

Hose lengths shall be as short as practical.

Pressure unions and joints above 0,1 MPa shall be made of metal except for any constrained sealing washers.

BB.3 Equipment

The supply of gas shall be automatically cut off when the engine stops irrespective of whether or not the ignition system has been switched off.

For multi-fuel applications, the system shall be designed to avoid the possibility of LPG entering any other fuel container, and to shut off each fuel source before the alternative one is opened.

If the machine is equipped with two or more containers to supply fuel, they shall be connected via a multiway valve, or other suitable means, so that LPG can only be drawn from one container at a time. The use of two or more containers at the same time shall not be possible.

Safety pressure relief valves or liquid level indicators shall be installed in such a way that they cannot discharge in the direction of the **operator** or onto machine components which may be a source of ignition.

All fuel system components shall be firmly secured to the machine.

Pressure reducing valves shall be readily accessible for inspection and maintenance.

Annex CC
(informative)

Emission of acoustical noise

CC.1 Noise reduction

Noise reduction at floor-treatment machines is an integral part of the design process and can be achieved by applying measures at source to control noise, see for example ISO/TR 11688-1. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values in relation to other machines of the same type with comparable non-acoustical technical data.

The major sound sources in floor-treatment machines are: motors, fan, brushes, pads.

CC.2 Noise test code

CC.2.1 Emission sound pressure level determination

The emission sound pressure level is measured in accordance with ISO 11201, grade 2.

The microphone is placed at a distance of 0,40 m ± 0,025 m behind the handle at a height of 1,55 m ± 0,075 m and directed towards to the geometrical center of the machine. The handle shall be positioned according to normal use as specified in the instructions for use.

CC.2.2 Sound power level determination

The sound power level is measured in accordance with ISO 3744, or with ISO 3743-1 if a suitable hard-walled test room is available, or with ISO 9614-2. The handle of the machine has to face towards the opposite direction of the x-axis defined for the microphone configurations in ISO 3744.

CC.2.3 Operating conditions

The operating condition shall be identical for the determination for both sound power and emission sound pressure level at the specified positions.

The machines shall be tested in a stationary position. The engine respective motors and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment. The machine shall be placed on a surface in accordance with 3.1.9.101 to 3.1.9.103 as applicable. The cleaning head operates at its highest speed; it is in contact with the ground. The suction system (if applicable) operates at its maximum suction power with the distance between ground and mouth of the suction system not exceeding 25 mm. The measurement time shall be at least 15 s after the machine had been operated for at least 10 min.

CC.2.4 Measurement uncertainties

A standard deviation of reproducibility σ_{RO} of less than 1,5 dB is expected for the A-weighted sound power level determined according to ISO 3744 and the A-weighted emission sound pressure level determined according to ISO 11201, grade 2.

CC.2.5 Information to be recorded

The information to be recorded covers all of the technical requirements of this noise test code. Any deviations from this noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.

CC.2.6 Information to be reported

The information to be included in the test report is at least that which the manufacturer requires for a noise emission declaration or the user requires to verify the declared values.

CC.2.7 Declaration and verification of noise emission values

The declaration of the emission sound pressure level shall be made as a dual-number noise emission declaration and shall declare the noise emission value L_{pA} and the respective uncertainty K_{pA}. The emission value shall be given where it exceeds 70 dB(A). Where this value does not exceed 70 dB(A), this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $L_{pA} \leq 70$ dB(A).

The sound power level shall be given as a dual-number noise emission declaration, where the emission sound pressure level exceeds 80 dB(A). It shall declare the emission value L_{WA} and separately the respective uncertainty K_{WA}.

For both, the declaration of the emission sound pressure level and the sound power level, the uncertainty K_{pA} and K_{WA} shall be calculated in accordance with ISO 4871.

Alternatively, if a minimum sample size of $n = 5$ is measured with at least 9 microphones simultaneously, both the uncertainty K_{pA} and K_{WA} may be determined as follows if measurement is done with enhanced accuracy at an ambient temperature of 20 C ± 10 C.

NOTE 1 Where the uncertainty is not calculated in accordance with the given standards or procedure, K_{pA} and K_{WA} are usually expected to be 3 dB.

$$K_{pA} = K_{WA} = 1{,}5 \cdot \sigma_t$$

with

– the total standard deviation $\sigma_t = \sqrt{\sigma_R^2 + \sigma_P^2}$,

– the standard deviation of reproducibility $\sigma_R = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2}$,

– and the standard deviation of production σ_P which has to be assumed for later (mass-)production.

Values for σ_R may be estimated to σ_R = 0,5 dB, if the environment correction K_2 (according to ISO 11201 and ISO 3744, see CC.2.1 and CC.2.2) is determined using a calibrated reference sound source (measurement and correction) with a value of not more than 0,4 dB.

NOTE 2 If K_2 is more than 0,4 dB, a value of σ_R = 0,5 dB as proposed here cannot be achieved. Correction of K_2 needs a lot of experience and comparison-measurements at optimal conditions.

The value for σ_P shall be calculated individually from the measurement results of at least the first 5 machines produced after determination of s_p for a sample size of $n \geq 5$ machines. Because the production variation may change under later production conditions, it is recommended to calculate σ_P as follows:

$$\sigma_P = SF \times s_p$$

The necessary size of the safety factor SF depends on the relation between s_p and σ_R as well as on the sample size n as shown in Table CC.1.

Table CC.1 – Determination of uncertainty

n	$s_p \leq \sigma_R$	$s_p > \sigma_R$
5 to 7	1,3	1,5
8 to 12	1,2	1,3
13 to 19	1,0	1,1
≥ 20	1,0	1,0

The noise declaration shall state that the noise emission values have been obtained according to the given standard or procedure. The noise declaration shall indicate clearly which standard or procedure was used regarding measurement as well as statistical calculation.

If undertaken, verification shall be conducted according to ISO 4871 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission values.

Annex DD
(informative)

Emission of vibration

DD.1 Reduction of vibration

The machine shall be designed and constructed in such a way that risks resulting from vibrations produced by the machine are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.

The handles shall be designed and constructed in such a way as to reduce the vibrations transmitted to the upper limbs of the **operator** to the lowest level that is reasonably possible.

DD.2 Information on vibration emission

The instructions shall give the following information:

– the vibration total value to which the hand-arm system is subjected, measured in accordance with ISO 5349-1 for arm vibrations, the machine being supplied at **rated power input** or at the maximum **rated power input** for machines with a range of power, if the vibration total value exceeds 2,5 m/s^2. Where this value does not exceed 2,5 m/s^2, this fact may be stated in place of the emission value and uncertainty, e.g. by declaring $a_h \leq 2{,}5$ m/s^2;

– the uncertainty surrounding these values in accordance with the above given standards.

These values shall be either those actually measured for the machine in question or those established on the basis of measurements taken for a technically comparable machine which is representative of the machine being produced.

Regarding operating conditions during measurement and the methods used for measurement, the reference of the standard applied (IEC 60335-2-67) shall be specified.

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

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

IEC 60335-2-10, *Household and similar electrical appliances – Safety – Part 2-10: Particular requirements for floor treatment machines and wet scrubbing machines*

IEC 60335-2-68, *Household and similar electrical appliances – Safety – Part 2-68: Particular requirements for spray extraction appliances, for commercial use*

IEC 60335-2-69, *Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for commercial use*

IEC 60335-2-72, *Household and similar electrical appliances – Safety – Part 2-72: Particular requirements for floor treatment machines with or without traction drive, for commercial use*

ISO 3743-1, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for small movable sources in reverberant fields – Part 1: Comparison method for a hard-walled test room*

ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

ISO 3864-1, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 4871, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 5349-1, *Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Part 1: General requirements*

ISO 9614-2, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning*

ISO 11201, *Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections*

ISO/TR 11688-1, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-67: Exigences particulières pour les machines de traitement des sols, à usage commercial

AVANT-PROPOS

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L'IEC 60335-2-67 a été établie par le sous-comité 61J: Appareils de nettoyage à moteur électrique pour usage commercial, du comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette cinquième édition annule et remplace la quatrième édition parue en 2012 et son Amendement 1:2016. Elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

– alignement rédactionnel et technique sur l'IEC 60335-1:2020.

Le texte de cette Norme internationale est issu des documents suivants:

CDV	Rapport de vote
61J/735/CDV	61J/742A/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements. Elle a été établie sur la base de la sixième édition (2020) de cette norme.

NOTE 1 L'expression "la Partie 1" utilisée dans la présente norme fait référence à l'IEC 60335-1.

La présente partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences particulières pour les machines de traitement des sols, à usage commercial.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans cette partie 2, ce paragraphe s'applique pour autant que cela soit raisonnable. Lorsque la présente norme mentionne "addition", "modification" ou "remplacement", le texte correspondant de la Partie 1 doit être adapté en conséquence.

NOTE 2 Le système de numérotation suivant est utilisé:

– les paragraphes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101;
– à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles des articles ou paragraphes qui sont remplacés;
– les annexes qui sont ajoutées sont désignées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

– exigences: caractères romains;
– *modalités d'essais: caractères italiques;*
– notes: petits caractères romains.

Les termes en **gras** dans le texte sont définis à l'Article 3. Lorsqu'une définition concerne un adjectif, l'adjectif et le nom associé figurent également en gras.

Une liste de toutes les parties de la série IEC 60335, publiées sous le titre général *Appareils électrodomestiques et analogues – Sécurité*, se trouve sur le site web de l'IEC.

NOTE 4 L'attention des Comités nationaux est attirée sur le fait que les fabricants d'appareils et les organismes d'essai peuvent avoir besoin d'une période transitoire après la publication d'une nouvelle publication IEC, ou d'une publication amendée ou révisée, pour fabriquer des produits conformes aux nouvelles exigences et pour adapter leurs équipements aux nouveaux essais ou aux essais révisés.

Le comité recommande que le contenu de cette publication soit entériné au niveau national au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

IMPORTANT – Le logo "*colour inside*" qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

INTRODUCTION

Il a été considéré en établissant cette Norme internationale que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

La présente norme reconnaît le niveau de protection internationalement accepté contre les dangers électriques, mécaniques, thermiques, liés au feu et au rayonnement des appareils lorsqu'ils fonctionnent comme en usage normal en tenant compte des instructions du fabricant. Elle couvre également les situations anormales auxquelles on peut s'attendre dans la pratique et elle tient compte de la façon dont les phénomènes électromagnétiques peuvent affecter le fonctionnement sûr des appareils.

Cette norme tient compte autant que possible des exigences de l'IEC 60364, de façon à rester compatible avec les règles d'installation quand l'appareil est raccordé au réseau d'alimentation. Cependant, des règles nationales d'installation peuvent être différentes.

Si un appareil relevant du domaine d'application de la présente norme comporte également des fonctions couvertes par une autre partie 2 de l'IEC 60335, la partie 2 correspondante est appliquée à chaque fonction séparément, dans la limite du raisonnable. Si cela est applicable, on tient compte de l'influence d'une fonction sur les autres fonctions.

Lorsqu'une partie 2 ne comporte pas d'exigences complémentaires pour couvrir les risques traités dans la Partie 1, la Partie 1 s'applique.

NOTE 1 Cela signifie que les comités d'études responsables pour les parties 2 ont déterminé qu'il n'était pas nécessaire de spécifier des exigences particulières pour l'appareil en question en plus des exigences générales.

Cette norme est une norme de famille de produits traitant de la sécurité d'appareils et a préséance sur les normes horizontales et génériques couvrant le même sujet.

NOTE 2 Les normes horizontales et génériques couvrant un risque ne sont pas applicables parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335. Par exemple, dans le cas des exigences de température de surface pour de nombreux appareils, des normes génériques, comme l'ISO 13732-1 pour les surfaces chaudes, ne sont pas applicables en plus de la Partie 1 ou des parties 2.

Un appareil conforme au texte de la présente norme ne sera pas nécessairement jugé conforme aux principes de sécurité de la norme si, lorsqu'il est examiné et soumis aux essais, il apparaît qu'il présente d'autres caractéristiques qui compromettent le niveau de sécurité visé par ces exigences.

Un appareil utilisant des matériaux ou présentant des modes de construction différents de ceux décrits dans les exigences de cette norme peut être examiné et essayé en fonction de l'objectif poursuivi par ces exigences et, s'il est jugé pratiquement équivalent, il peut être estimé conforme aux principes de sécurité de la norme.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-67: Exigences particulières pour les machines de traitement des sols, à usage commercial

1 Domaine d'application

L'article de la Partie 1 est remplacé par le texte suivant:

La présente partie de l'IEC 60335 traite de la sécurité des machines de traitement des sols destinées à un usage commercial en intérieur ou en extérieur pour les applications suivantes:

– le brossage,
– le ramassage à sec ou en présence d'eau,
– le polissage et le polissage à sec,
– l'application de cire, de produits d'étanchéité et de détergents à base de poudre,
– le nettoyage par shampouineuse,
– le décapage, l'abrasion et la scarification

des sols avec une surface artificielle.

Ces machines présentent un mouvement de nettoyage plus latéral ou périodique que linéaire.

NOTE 101 En revanche, le mouvement de nettoyage des machines couvertes par l'IEC 60335-2-72 est plus linéaire que latéral ou périodique.

NOTE 102 La présente norme s'applique aux machines à **usage commercial**. La liste suivante, bien que non exhaustive, donne une indication des endroits inclus dans le domaine d'application:

– zones ouvertes au public, telles que les hôtels, les écoles, les hôpitaux;
– sites industriels, par exemple usines et ateliers de fabrication;
– commerces de détail, par exemple magasins et supermarchés;
– locaux commerciaux, par exemples bureaux et banques;
– tous les usages autres que l'utilisation domestique normale.

Ces machines ne sont pas équipées d'une **commande de dispositif de déplacement**.

NOTE 103 Les machines conçues pour la même fonction prévue mais équipées d'une commande de dispositif de déplacement sont couvertes par l'IEC 60335-2-72.

Les systèmes d'alimentation suivants sont couverts:

– moteurs à combustion interne,
– moteurs alimentés par le réseau de **tension assignée** inférieure ou égale à 250 V pour les appareils monophasés et à 480 V pour les autres appareils,
– **machines alimentées par batteries**.

Les **machines alimentées par batteries** peuvent être équipées d'un chargeur de batterie intégré.

La présente norme ne s'applique pas:

– aux aspirateurs et aux appareils de nettoyage à aspiration d'eau à usage domestique (IEC 60335-2-2);
– aux appareils de traitement des sols à usage domestique (IEC 60335-2-10);
– aux machines de nettoyage par pulvérisation et aspiration à **usage commercial** (IEC 60335-2-68);
– aux aspirateurs qui fonctionnent en présence d'eau ou à sec, y compris les brosses motorisées, à **usage commercial** (IEC 60335-2-69);

NOTE 104 L'IEC 60335-2-68 et l'IEC 60335-2-69 couvrent uniquement les machines sans commande de dispositif de déplacement.

– aux machines de traitement des sols avec ou sans **commande de dispositif de déplacement**, à **usage commercial** (IEC 60335-2-72);
– aux **outils** électroportatifs et portables à moteur (série IEC 60745, série IEC 61029, série IEC 62841);
– aux machines destinées à être utilisées dans des environnements corrosifs ou explosifs (poussière, vapeur ou gaz);
– aux machines destinées à aspirer de la poussière dangereuse (comme défini dans l'IEC 60335-2-69), des substances inflammables ou des particules incandescentes;
– aux machines destinées à être utilisées dans des véhicules ou à bord de navires ou d'avions.

NOTE 105 L'attention est attirée sur le fait que, dans de nombreux pays, des exigences supplémentaires relatives à l'utilisation en toute sécurité de l'équipement couvert peuvent être spécifiées par les organismes sanitaires nationaux, par les organismes nationaux responsables de la protection des travailleurs, par les organismes nationaux responsables de l'alimentation en eau et par des organismes similaires.

2 Références normatives

L'article de la Partie 1 est applicable, avec l'exception suivante.

Addition:

IEC TS 62885-1, *Surface cleaning appliances – Part 1: General requirements on test material and test equipment* (disponible en anglais seulement)

ISO 6344-2, *Abrasifs appliqués – Granulométrie – Partie 2: Détermination de la distribution granulométrique des macrograins P12 à P220*

3 Termes et définitions

L'article de la Partie 1 est applicable avec l'exception suivante.

3.1.9 *Addition:*
conditions de fonctionnement normal
conditions dans lesquelles la machine est mise en fonctionnement en usage normal, comme prévu par le fabricant

Cela désigne la charge qui correspond à la **puissance d'entrée assignée** ou la charge atteignable la plus élevée parmi toutes les charges particulières de différentes fonctions qui peuvent être utilisées en même temps conformément aux instructions du fabricant.

Les réservoirs des machines, le cas échéant, sont remplis avant le début du fonctionnement jusqu'au niveau le plus élevé indiqué sur le réservoir, ou entièrement remplis en l'absence de marquage.

Les fonctions d'aspiration, le cas échéant, sont activées pendant le fonctionnement.

Les **conditions de fonctionnement normal** relatives aux fonctions opérationnelles sont spécifiées du 3.1.9.101 au 3.1.9.103.

3.1.9.101 Les machines destinées au brossage, au décapage, à l'abrasion et à la scarification sont mises en fonctionnement avec les brosses ou patins appropriés sur une surface constituée de dalles de béton pressées hydrauliquement (voir Annexe AA normative).

Une surface en béton lisse d'une consistance comparable aux dalles de béton pressées hydrauliquement constitue une alternative.

3.1.9.102 Les machines destinées au polissage et au polissage à sec sont mises en fonctionnement comme suit.

Les surfaces en PVC ou analogues sont considérées comme adaptées pour l'établissement des **conditions de fonctionnement normal**. La crête de puissance d'entrée qui se produit pendant le processus de séchage de l'agent chimique appliqué pour traiter la surface n'est pas prise en compte dans les **conditions de fonctionnement normal**, mais est moyennée par extension des mesures sur une période d'au moins 10 min.

3.1.9.103 Les machines à laver les tapis sont mises en fonctionnement sur une surface d'essai constituée d'un tapis, conformément à l'IEC TS 62885-1, celui-ci étant fixé au sol.

Avant les essais, la brosse de la machine est conditionnée en étant mise en fonctionnement pendant 15 min sur une surface en béton propre et sèche. Après avoir parcouru la surface en béton, la brosse est immergée dans une solution de lavage pendant au moins 30 min.

3.101
machine de nettoyage à aspiration d'eau
machine destinée à l'application et à l'aspiration d'une solution de nettoyage à base d'eau

3.102
tête de nettoyage motorisée
dispositif de nettoyage tenu ou guidé à la main, relié à la machine et équipé d'un moteur électrique intégré

Note 1 à l'article: La tête de nettoyage principale fixée de manière permanente n'est pas considérée comme une **tête de nettoyage motorisée**.

3.103
commande de dispositif de déplacement
système utilisé pour propulser la machine, par exemple au moyen de roues motrices.

Note 1 à l'article: La traction sous l'effet de brosses rotatives n'est pas incluse.

3.104
commande de présence de l'opérateur
OPC
dispositif de commande qui coupe automatiquement l'alimentation, par exemple d'un entraînement ou d'un moteur, en cas de retrait de la force d'actionnement de l'**opérateur**

Note 1 à l'article: Ces dispositifs peuvent être, par exemple, des commandes à action continue (commandes "à action maintenue").

Note 2 à l'article: L'abréviation "**OPC**" est dérivée du terme anglais développé correspondant "operator presence control ".

3.105
protecteur
élément de la machine spécifiquement conçu pour assurer une protection au moyen d'une barrière matérielle, par exemple un boîtier, une gaine, un couvercle, un écran, une porte, une enveloppe ou une clôture; d'autres éléments de la machine qui remplissent une fonction opérationnelle essentielle, par exemple le cadre de la machine, peuvent également remplir une fonction de protection, mais ne sont pas désignés comme des **protecteurs**

Note 1 à l'article: Trois principaux types de **protecteurs** peuvent être distingués: les **protecteurs** fixes, les **protecteurs** de verrouillage mobiles et les **protecteurs** réglables. Des **protecteurs** de verrouillage mobiles sont exigés lorsqu'un accès fréquent est envisagé, tandis que des **protecteurs** fixes peuvent être utilisés lorsqu'un accès fréquent n'est pas envisagé.

3.106
opérateur
personne qui assure l'installation, le fonctionnement, le réglage, l'entretien, le nettoyage ou le transport de la machine

3.107
solution d'essai
solution composée de 20 g de NaCl et de 1 ml d'une solution de 28 % par masse de dodécylsulfate de sodium pour 8 l d'eau

Note 1 à l'article: La désignation chimique du dodécylsulfate de sodium est $C_{12}H_{25}NaSO_4$.

3.108
usage commercial
usage prévu des machines couvertes par la présente norme, c'est-à-dire des machines non destinées à une utilisation domestique normale par des personnes privées, mais qui peuvent représenter un danger pour le public

Cela signifie en particulier

– que les machines peuvent être utilisées par le personnel des entreprises de nettoyage, le personnel d'entretien, etc.;
– qu'elles sont utilisées dans des locaux commerciaux ou publics (c'est-à-dire les bureaux, les magasins, les hôtels, les hôpitaux, les écoles, etc.) ou dans les environnements industriels (usines, etc.) et dans l'industrie légère (ateliers, etc.)

Note 1 à l'article: L'**usage commercial** est également appelé utilisation professionnelle.

4 Exigences générales

L'article de la Partie 1 est applicable avec l'exception suivante.

Remplacement du premier alinéa par le texte suivant:

Les machines doivent être construites de telle façon qu'elles fonctionnent en toute sécurité et qu'elles ne présentent aucun danger pour les personnes ou leur environnement en usage normal, même en cas de négligence, et durant l'installation, le réglage, l'entretien, le nettoyage, le dépannage ou le transport.

Addition:

Pour les besoins de la présente norme, le terme "appareil" utilisé dans la Partie 1 doit être compris comme "machine".

5 Conditions générales d'essais

L'article de la Partie 1 est applicable, avec l'exception suivante.

5.101 *La **solution d'essai** doit être stockée dans une atmosphère fraîche et utilisée dans un délai de sept jours après sa préparation.*

6 Classification

L'article de la Partie 1 est applicable avec les exceptions suivantes.

6.1 *Remplacement:*

Les machines doivent appartenir à l'une des classes suivantes d'après la protection contre les chocs électriques:

– **classe I**,
– **classe II**, ou
– **classe III**.

La vérification est effectuée par examen et par les essais applicables.

6.2 *Addition:*

Les machines alimentées par le réseau destinées à une utilisation à l'intérieur et au nettoyage à sec uniquement doivent être au moins de classe IPX0. Les autres machines doivent être au moins de classe IPX4. Les machines conçues pour une utilisation à sec qui peuvent être équipées d'accessoires supplémentaires qui les transforment en machines qui fonctionnent en présence d'eau doivent être conformes à la classe IPX4 lorsqu'elles sont équipées de tels accessoires.

NOTE 101 Les machines équipées d'accessoires amovibles pour le nettoyage en présence d'eau peuvent être conformes à la classe IP IPX0 pour les besoins du nettoyage à sec.

7 Marquages et instructions

L'article de la Partie 1 est applicable avec les exceptions suivantes.

7.1 *Modification:*

Remplacer le quatrième tiret comme suit:

– le nom commercial et l'adresse du fabricant et, le cas échéant, ceux de son mandataire; toute adresse doit être suffisamment complète pour permettre une communication par courrier;

Addition:

Les machines doivent également porter les marquages suivants:

– le numéro de série, le cas échéant;
– la désignation de la machine et série ou type, permettant ainsi l'identification technique du produit. Cela peut être réalisé par une combinaison de lettres et/ou de chiffres;

NOTE 101 La désignation de la machine, la série ou le type inclut la référence du modèle ou du type, comme exigé dans la Partie 1.

– l'année de construction, c'est-à-dire l'année durant laquelle a été achevé le processus de fabrication.

NOTE 102 L'année de construction peut faire partie du numéro de série.

Les machines doivent porter le marquage de la masse de la configuration la plus courante en kg.

Les machines destinées à une utilisation à l'intérieur et alimentées par des moteurs à combustion interne doivent être marquées du symbole conforme à la Figure 106. La représentation de ce symbole en couleur monochrome est acceptable.

7.1.101 Les **têtes de nettoyage motorisées** doivent porter les marquages suivants:

– la **tension assignée** ou la **plage assignée de tensions** en volts;
– la **puissance d'entrée assignée** en watts;
– le nom, la marque commerciale ou la marque d'identification du fabricant ou du fournisseur agréé;
– la référence du modèle ou du type;
– la masse de la configuration la plus courante en kg.

Les **têtes de nettoyage motorisées** pour appareils de nettoyage à aspiration d'eau, à l'exception de celles de **construction de classe III** dont la **tension de service** ne dépasse pas 24 V, doivent être marquées du symbole IEC 60417-5935 (2012-09).

NOTE Ce symbole est un signal d'information et, excepté pour les couleurs, les règles de l'ISO 3864-1 s'appliquent.

La vérification est effectuée par examen.

7.6 *Addition:*

	[symbole IEC 60417-5935 (2012-09)]	**tête de nettoyage motorisée** pour nettoyage à aspiration d'eau

7.12 *Modification:*

Supprimer le premier alinéa et la première mise en garde.

Ajouter, après la Note, le nouveau texte suivant:

NOTE 101 D'autres exigences concernant les instructions en version papier sont disponibles au 7.12.9.

Remplacement du quatrième alinéa par le texte suivant.

Cette machine n'est pas destinée à être utilisée par des personnes (y compris des enfants) qui possèdent des capacités physiques, sensorielles ou mentales réduites, ou qui ont un manque d'expérience et de connaissance.

Addition:

La page de couverture de la notice d'instructions doit inclure, en substance, la mise en garde suivante:

AVERTISSEMENT Lire les instructions avant toute utilisation de la machine.

Cette formulation peut être remplacée par les symboles ISO 7000-0434A (2004-01) et ISO 7000-0790 (2004-01).

Les instructions doivent contenir au moins les informations suivantes:

– le nom commercial et l'adresse complète du fabricant et, le cas échéant, ceux de son mandataire;

– la désignation de la série ou du type de la machine, qui figurent sur la machine elle-même, à l'exception du numéro de série;

NOTE 101 La désignation de la série ou du type peut être absente, tant que l'identification du produit est assurée.

– la description générale de la machine;

– l'usage prévu de la machine et de l'équipement auxiliaire couverts par le domaine d'application de la présente norme;

NOTE 102 Les unités de pulvérisation, les unités d'aspiration et les lampes sont des exemples d'équipements auxiliaires.

– la signification des symboles utilisés sur la machine et dans les instructions;

– les dessins, schémas, descriptions et explications nécessaires à l'utilisation en toute sécurité, l'entretien et la réparation de la machine et afin d'en vérifier le fonctionnement correct;

– les données techniques, y compris les marquages apposés sur la machine;

– les informations relatives à la mise en service, au fonctionnement en toute sécurité, à la manipulation, au transport et au stockage de la machine, en tenant compte de son poids;

– les instructions qui permettent de réaliser le réglage et l'entretien en toute sécurité, y compris les mesures de protection qu'il convient de prendre pendant ces opérations;

– les conditions dans lesquelles la machine satisfait à l'exigence de stabilité pendant son utilisation, son transport, son assemblage, son démontage lorsqu'elle est hors service, pendant des essais ou des arrêts prévisibles;

– la procédure à suivre afin d'éviter des situations dangereuses en cas d'accident (par exemple, contact ou déversement de détergents, d'acide de batterie, de carburant ou d'huile) ou de panne de l'équipement;

– en substance, l'indication suivante:

  Cette machine est destinée à un usage commercial, par exemple dans les hôtels, les écoles, les hôpitaux, les usines, les commerces, les bureaux et les entreprises de location.

Les instructions doivent indiquer le type et la fréquence des examens et de l'entretien exigés pour assurer une utilisation en toute sécurité, y compris les mesures d'entretien préventif. Elles doivent, le cas échéant, fournir les spécifications des pièces de rechange si elles compromettent la santé et la sécurité de l'**opérateur**.

En outre, les instructions doivent fournir les informations suivantes, si cela est applicable:

– pour les machines qui fonctionnent sur batterie, des instructions concernant les précautions à prendre pour le chargement en toute sécurité;

– les précautions à prendre lors du remplacement des brosses ou d'autres accessoires;

– les informations relatives aux détergents ou autres liquides qui peuvent être utilisés, y compris le choix et l'utilisation d'un équipement de protection individuelle (EPI);

– les caractéristiques essentielles de l'équipement auxiliaire qui peut être installé sur la machine;

– les informations concernant la mise au rebut en toute sécurité des batteries;

– l'usage prévu des brosses spécifiées pour la machine;

– si des jantes divisées sont utilisées pour les pneus, des instructions doivent être données pour le remplacement sûr des pneus.

7.12.9 *Ajouter le texte suivant après le deuxième alinéa*:

A la place d'une version papier, un format électronique peut être utilisé si les conditions suivantes sont respectées:

– les instructions de déballage, d'installation et d'accès à l'ensemble des instructions de sécurité sur un dispositif de lecture approprié doivent être fournies sur papier ou inscrites sur la machine;

– le dispositif de lecture approprié doit être fourni avec la machine ou être nécessaire pour faire fonctionner la machine; et

– le contenu des instructions électroniques doit être fourni avec la machine.

Pour l'utilisation fonctionnelle non relative à la sécurité, le manuel d'utilisation peut être fourni au format électronique:

– sur un affichage électronique adapté intégré à l'appareil; ou

– sur un dispositif électronique distinct fourni avec l'appareil; ou

– par le biais d'un lien vers un site web, où il peut être consulté et/ou téléchargé.

7.12.101 Les instructions doivent inclure des mises en garde sur les façons dont la machine ne doit pas être utilisée, et qui sont susceptibles de se produire selon l'expérience du fabricant. Elles doivent au moins inclure, en substance, si elles sont applicables, les mises en garde suivantes:

– MISE EN GARDE Les opérateurs doivent être formés de façon adaptée à l'utilisation de ces machines.

– MISE EN GARDE Utiliser uniquement les brosses fournies avec l'appareil ou celles spécifiées dans les instructions. L'utilisation d'autres brosses peut compromettre la sécurité.

– MISE EN GARDE Cette machine est uniquement destinée à une utilisation à sec.

– MISE EN GARDE Ne pas inhaler les gaz d'échappement. Utilisation à l'intérieur uniquement lorsqu'une ventilation adéquate est assurée et qu'une deuxième personne est chargée de la supervision.

– AVERTISSEMENT Cette machine est uniquement destinée à une utilisation à l'intérieur.

– AVERTISSEMENT Cette machine doit uniquement être stockée à l'intérieur.

– Une mise en garde qui précise que la machine doit être déconnectée de sa source d'alimentation durant le nettoyage ou l'entretien et lors du remplacement de pièces ou de la conversion de la machine pour une autre fonction:

  - en retirant la fiche de prise de courant du socle de prise de courant pour les machines qui fonctionnent sur secteur;
  - en déconnectant de manière sécurisée au moins le pôle de la batterie qui n'est pas relié au cadre ou en utilisant une méthode équivalente (appareil de déconnexion) pour les machines qui fonctionnent sur batterie;
  - en déconnectant la batterie pour les machines qui fonctionnent sur moteur à combustion interne équipées d'un démarreur de batterie.

Les instructions applicables aux machines qui fonctionnent sur secteur doivent également comprendre, en substance, la mise en garde suivante:

– MISE EN GARDE Ne pas laisser le câble d'alimentation entrer en contact avec les brosses rotatives ou les patins.

Les instructions applicables aux machines qui comportent un flexible conducteur pour aspiration à sec et qui fonctionnent sous une tension autre que la **très basse tension de sécurité** doivent également comprendre, en substance, la mise en garde suivante:

– MISE EN GARDE Ce flexible comporte des raccordements électriques: ne pas l'utiliser pour recueillir de l'eau et ne pas l'immerger dans l'eau pour le nettoyage.

Les instructions applicables aux machines qui fonctionnent sur moteur à combustion interne au GPL doivent également comprendre, en substance, la mise en garde suivante:

– MISE EN GARDE Les machines doivent être stationnées en toute sécurité.

– La machine doit être régulièrement examinée par une personne qualifiée, en particulier le réservoir de GPL et les raccordements, comme exigé par les réglementations régionales ou nationales pour assurer une utilisation en toute sécurité.

La vérification est effectuée par examen.

7.12.102 Informations relatives au bruit

NOTE Les instructions peuvent fournir des informations relatives aux émissions de bruit aérien, indiquées en CC.2.7.

7.12.103 Informations relatives aux vibrations

NOTE Les instructions peuvent fournir des informations relatives aux émissions de vibrations, indiquées à l'Article DD.2.

7.13 *Addition:*

Les termes "Instructions d'origine" doivent figurer dans la ou les langues vérifiées par le fabricant.

7.14 *Addition:*

La hauteur du symbole IEC 60417-5935 (2012-09) doit être d'au moins 15 mm.

La vérification est effectuée par mesurage.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 est applicable avec les exceptions suivantes.

8.1 *Addition:*

Les agents de nettoyage à base d'eau sont considérés comme conducteurs.

8.1.1 *Ajouter le texte suivant après le sixième alinéa:*

NOTE Les appareils conformes à la présente norme ne sont pas considérés comme étant destinés à être installés dans une zone ouverte au public.

9 Démarrage des appareils à moteur

L'article de la Partie 1 est remplacé par le texte suivant:

Il ne doit être possible de démarrer la machine que par l'actionnement volontaire d'un dispositif de commande prévu à cet effet. La même exigence s'applique au redémarrage de la machine après un arrêt, quelle qu'en soit la cause. Cette exigence ne s'applique aux composants que si leur démarrage accidentel est susceptible de provoquer un danger. Elle ne s'applique pas aux composants tels que les unités d'aspiration, les pompes, etc.

La vérification est effectuée et par essai.

10 Puissance et courant

L'article de la Partie 1 est applicable.

11 Echauffements

L'article de la Partie 1 est applicable avec les exceptions suivantes:

11.4 Non applicable.

11.6 Non applicable.

11.7 *Addition:*

Les machines sont mises en fonctionnement jusqu'à l'établissement des conditions de régime.

11.8 *Ajouter ce qui suit au Tableau 3, à la fin de la note de bas de tableau a.*

Les moteurs hermétiquement clos sont considérés comme étanches.

12 Charge des batteries à ions métalliques

L'article de la Partie 1 est applicable.

13 Courant de fuite et rigidité diélectrique à la température de régime

L'article de la Partie 1 est applicable avec l'exception suivante.

13.2 *Addition:*

*Pour les **appareils de la classe I** dont plusieurs moteurs fonctionnent simultanément, le courant de fuite ne doit pas dépasser 3,5 mA.*

14 Surtensions transitoires

L'article de la Partie 1 est applicable.

15 Résistance à l'humidité

L'article de la Partie 1 est applicable avec les exceptions suivantes.

15.1.2 *Addition:*

Les machines de nettoyage qui fonctionnent en présence d'eau, à l'exception des shampouineuses, sont mises en fonctionnement pendant 10 min, en réalisant des mouvements de va-et-vient sur une distance de 1 m à un rythme de 15 cycles par minute, sur un sol constitué de dalles de surface lisse fixées au fond d'un bac. Au début de l'essai, le bac est rempli de ***solution d'essai*** *à un niveau d'environ 5 mm au-dessus de la surface du sol.*

15.2 *Remplacement:*

Les machines qui disposent d'un réservoir de liquide doivent être construites de telle sorte que

– le débordement de liquides dû aux **conditions de fonctionnement normal**,
– le remplissage incluant le remplissage excessif, et
– le renversement des **appareils portatifs** et des machines qui ne sont pas stables

n'impactent pas leur isolation électrique.

Les réservoirs prévus pour les liquides suivants sont exclus des essais:

– huile hydraulique;
– liquide de refroidissement;
– carburant (diesel, essence, GPL).

La vérification est effectuée par les essais suivants:

La machine est placée sur un support incliné à un angle de 10° par rapport à l'horizontale, le réservoir de liquide étant rempli à la moitié du niveau indiqué dans les instructions. Une machine est considérée comme n'étant pas stable si elle se renverse lorsqu'une force de 180 N est appliquée au sommet de la machine, dans la direction horizontale la plus défavorable.

Les machines qui disposent d'un réservoir de liquide et d'un socle de connecteur sont équipées d'un connecteur et d'un câble souple appropriés; les machines qui disposent d'un réservoir de liquide et d'une ***fixation du type X*** *sont équipées de la section la plus légère spécifiée dans le Tableau 11. Les autres machines sont soumises à l'essai dans l'état de livraison.*

Le réservoir de liquide de la machine est complètement rempli d'une solution saline d'eau qui contient approximativement 1 % de NaCl et 0,6 % d'agent de rinçage non ionique, et une quantité supplémentaire de cette solution égale à 15 % de la capacité du réservoir ou 0,25 l, suivant la valeur la plus élevée, est alors versée régulièrement en 1 min.

Tout agent de rinçage disponible dans le commerce peut être utilisé, mais en cas de doute concernant les résultats d'essai, l'agent de rinçage doit présenter les propriétés suivantes:

- viscosité, 17 mPa s;
- pH, 2,2 (1 % dans l'eau)
- et sa composition doit comprendre les substances suivantes

– Plurafac ® LF 221[1]	15,0 % par masse
– Cumène sulfonate (solution à 40 %)	11,5 % par masse
– Acide citrique (anhydre)	3,0 % par masse
– Eau désionisée	70,5 % par masse

*Les **appareils portatifs** et les machines qui ne sont pas stables sont ensuite renversés, avec le réservoir entièrement rempli et le couvercle en place, à partir de la position normale d'utilisation la plus défavorable, puis laissés dans cette position pendant 5 min, sauf si la machine revient automatiquement à sa position normale d'utilisation.*

*Les **têtes de nettoyage motorisées** des **machines de nettoyage à aspiration d'eau** sont placées dans un bac dont la base est de niveau avec la surface de support de la machine. Le bac est rempli de **solution d'essai** jusqu'à 5 mm au-dessus de sa base, ce niveau étant maintenu tout au long de l'essai. La machine, incluant la **tête de nettoyage motorisée**, est mise en fonctionnement jusqu'à ce que son réservoir de liquide soit totalement plein, puis pendant 5 min supplémentaires.*

Après chacun de ces essais, la machine doit satisfaire à l'essai de rigidité diélectrique décrit au 16.3.

*Il ne doit pas y avoir de trace de liquide sur l'isolation qui réduise les **distances dans l'air** ou les **lignes de fuite** au-dessous des valeurs spécifiées à l'Article 29.*

15.3 *Modification:*

L'humidité relative doit être de (93 ± 6) %.

15.101 Les **têtes de nettoyage motorisées** des **machines de nettoyage à aspiration d'eau** doivent résister aux liquides qui peuvent venir en contact avec elles en usage normal.

L'essai suivant n'est pas applicable aux **têtes de nettoyage motorisées** de **construction de classe III** et dont la **tension de service** ne dépasse pas 24 V.

La vérification est effectuée par les quatre essais suivants.

*La **tête de nettoyage motorisée** est soumise à un essai de chocs décrit dans l'IEC 60068-2-75, la valeur de l'impact étant de 2 J. La **tête de nettoyage motorisée** est fixée sur un support rigide et trois coups sont appliqués à chaque point de l'enveloppe potentiellement faible.*

[1] Plurafac ® LF 221 est l'appellation commerciale d'un produit distribué par BASF. Cette information est donnée à l'intention des utilisateurs du présent document et ne signifie nullement que l'IEC approuve l'emploi du produit ainsi désigné.