IEC 60335-2-72

Edition 5.0 2021-07

INTERNATIONAL STANDARD

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-72: Particular requirements for floor treatment machines with or without traction drive, for commercial use

FOREWORD

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IEC 60335-2-72 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 2016. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition (minor changes are not listed):

– editorial and technical alignment with IEC 60335-1:2020;
– rearrangement of subclauses to consistent numbering 22.101 to 22.113.

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

CDV	Report on voting
61J/738/CDV	61J/744A/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 with or without traction drive, for commercial use.

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

NOTE 2 The following numbering system is used:

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

NOTE 3 The following print types are used:

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

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

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

The following differences exist in the countries indicated below.

– Annex AA: The CO-emission of LPG driven machines, intended to be used indoors, has to comply with the value specified in Annex BB. The result shall be documented (Germany).
– Annex BB: For machines intended to be used indoors, except single cylinder engines, the exhaust gas shall not contain more than 0,1 % volume of carbon monoxide (CO). If adjustments are necessary, the adjusting means shall be easily accessible. The measurement shall be carried out with a warm engine, idling, using 98 % propane. The revolution speed of the engine shall be documented (Germany).

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

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

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

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

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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.

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-72: Particular requirements for floor treatment machines with or without traction drive, 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 ride-on and powered **walk-behind machines** intended for commercial indoor or outdoor use for the following applications:

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

of floors.

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

NOTE 101 By contrast, the cleaning motion of machines covered by IEC 60335-2-67 is more lateral or periodic than linear.

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 may be equipped with a **traction drive** system. 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

– floor treatment appliances for household use (IEC 60335-2-10);
– floor treatment machines for **commercial use** (IEC 60335-2-67);
– 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);

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NOTE 103 IEC 60335-2-67, IEC 60335-2-68 and IEC 60335-2-69 cover only machines without **traction drive**.

– road sweepers;

NOTE 104 In Europe, EN 13019 covers road sweepers.

– machines designed for use on **slopes** with a gradient exceeding 20 %;
– machines equipped with a power take-off (PTO);
– 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;
– **ride-on machines** designed for transport over public roads can be subject to additional requirements (e.g. lighting, license plate etc.).

NOTE 106 Requirements for fuel-cells are under consideration.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 62061, *Safety of machinery – Functional safety of safety-related control systems*

IEC 62485-3:2014, *Safety requirements for secondary batteries and battery installations – Part 3: Traction batteries*

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

ISO 3411, *Earth moving machinery – Physical dimensions of operators and minimum operator space envelope*

ISO 5353, *Earth-moving machinery, and tractors and machinery for agriculture and forestry – Seat index point*

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

ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 13857:2019, *Safety of machinery – Safety distances to prevent hazard zones being reached by the upper and lower limbs*

ISO 25119 (all parts), *Tractors and machinery for agriculture and forestry – Safety-related parts of control systems*

Replacement:

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

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3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*
normal operation
conditions under which the machine is operated in normal use, 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 in accordance with the manufacturer's instructions. For machines provided with a seat or an **operator** platform, a mass of 75 kg secured in position at the appropriate height is used to simulate the **operator** in the most unfavourable position. Internal combustion engine driven machines are operated with the fuel specified by the manufacturer except where otherwise stated in this standard.

Operational functions include all treatment and driving functions.

Operation of the machine under following conditions:

– the battery is charged, the battery being initially discharged to such an extent that the appliance cannot operate;
– if possible, the appliance is supplied from the supply mains through its standalone battery charger, the battery being initially discharged to such an extent that the appliance cannot operate. The appliance is operated as specified in the main part of this standard;
– if possible, **built-in battery chargers** are connected to the circuit of Figure 107. The variable resistor is adjusted so that the current in the circuit is the **rated DC output current** when the battery charger is supplied at rated voltage. When the charging current is controlled by the state of charge of the battery, the variable resistor and the capacitor are replaced by a discharged battery of the type and having the largest capacity specified in the instructions.
– if the appliance incorporates inductive coupling between two parts that are detachable from each other, the appliance is supplied from the supply mains with the detachable part removed.

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 and sweeping machines are operated on a surface of hydraulically pressed concrete paving slabs (see normative Annex AA) intermittently at least 30 min switched on, and for a period of 5 min switched off.

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 flooring 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.

The solution tank is filled and the machine is operated over a period of 10 min.

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3.6.9 *Addition:*

Note 101 to entry: Sets of batteries are regarded as a single battery if they require tools to disconnect the individual battery interconnections.

3.101
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.

3.102
walk-behind machine
machine with or without a **traction drive** designed to be controlled by the **operator** walking behind the machine

It may be equipped with a detachable **sulky**.

3.103
ride-on machine
machine with a **traction drive** and with an **operator** seat or a platform on which the **operator** is sitting/standing during operation

3.104
sulky (trailer)
removable trailing seat or stand-on platform with wheels or skids designed to carry an **operator** in a sitting or standing position, while controlling a **walk-behind machine** with **traction drive**

3.105
wet cleaning machine
machine for applying and sucking up liquids

3.106
water-suction cleaning machine
machine for sucking up liquids

3.107
motorized cleaning head
hand-held or hand-guided cleaning device connected to the machine, with an integrated electrical motor

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

3.108
hopper
container to store picked up debris

3.109
parking brake
means, actuated by the **operator** in the normal operating position, to prevent a stationary machine from moving

3.110
service brake
means for decelerating and stopping a machine, with a **traction drive**, from its ground travel speed

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3.111
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) or seat switches.

3.112
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.

3.113
operator
person in direct physical contact with the machine and performing one or more of the following tasks: installing, operating, adjusting, cleaning, moving, or performing user maintenance on the machine

3.114
gross vehicle weight
GVW
maximum allowable fully laden weight of the machine and its payload, as ready for use

Note 1 to entry: See 5.102 for further test conditions.

3.115
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 $C_{12}H_{25}NaSO_4$.

3.116
level surface
plane with a gradient up to and including 2 %

3.117
slope
inclined plane with a gradient greater than 2 % but not exceeding 20 %

3.118
maximum cleaning gradeability
maximum gradient according to manufacturer's instruction and as indicated on the machine, on which the machine can be used safely for cleaning purposes

3.119
maximum transport gradeability
maximum gradient according to manufacturer's instruction, on which the machine can be used safely for transport purposes

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3.120
built-in charger
charger mounted on or into the machine and designed to operate only on or into the machine

Note 1 to entry: **Built-in battery chargers** can also be called on-board chargers.

3.121
built-in charger with power supply function
component intended to provide power for charging, operation or both

3.122
commercial use
intended use of machines covered by this standard, i.e. not intended for normal housekeeping purposes by private persons but which may be a source of danger to the public

I.e. in particular that

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

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

3.123
battery low voltage
BLV
battery-supplied floating DC working voltage in the range of >42 V and ≤60 V

Batteries of **BLV** systems may be charged with voltages up to 75 V DC. All voltages are regarded as DC if the peak-to-peak value does not exceed 10 % of the average value.

Note 1 to entry: **BLV** is not considered to be of class I, class II, or class III.

3.124
hazardous voltage
voltage between parts having an average value exceeding 60 V DC or 42 V peak when the peak-to-peak ripple exceeds 10 % of the average value

3.125
battery connector
plug connecting system applied for the connection of the battery either with the charging system, or with the machine, which can be engaged and disengaged without the use of any tools

3.126
BLV insulation
insulation applied to **live parts** to provide basic protection against electric shock and which is identical with **basic insulation** in the voltage range defined by **BLV**

3.127
rated DC output voltage
output voltage assigned to the battery charger by the manufacturer

3.128
rated DC output current
output current assigned to the battery charger by the manufacturer

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4 General requirement

This clause of Part 1 is applicable except as follows:

Replacement of the first paragraph by the following:

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

Addition:

For the purposes 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.

5.8.1 *Addition:*

When measuring voltage, the peak value of any superimposed ripple exceeding 10 % of the average value shall be included. Transient voltages are ignored, such as a temporary increase of voltage, for example after the battery is disconnected from the charging circuit.

5.17 *Modification:*

Built-in chargers in compliance with IEC 60335-2-29 do not need to be retested, except for Clauses 6, 7, 11, 15, 19 and 22.

Clause 29 needs to be reevaluated if the pollution degree of the microenvironment for the battery charger is 1 or 2 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution due to normal use of the machine.

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

5.102 *The **GVW** includes, if applicable, full clean water tanks, empty dirty water tanks (half full for recycling systems), empty dust bags, **hopper** loaded at rated capacity, largest recommended batteries, all options such as cords, hoses, wands, cleaning agents, brooms and brushes.*

*For **ride-on machines**, the **GVW** includes a standard **operator**, weighing 75 kg.*

5.103 *Liquid containers of machines for wet scrubbing and shampooing are filled to the highest level indicated by the manufacturer.*

5.104 *Machines that are designed to have a **sulky** are tested with the **sulky** including the weight of a standard **operator** (75 kg) or without the **sulky**, whichever is the most unfavourable condition.*

5.105 *Combustion engine-powered machines shall be supplied with the fuel as specified by the manufacturer, except if stated elsewhere in this standard.*

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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 (see Table 101):

Table 101 – Machine classification

Working voltage DC	Working voltage AC	Classification mains-supplied circuits	Classification battery-supplied circuits
≤ 42 V (**SELV**)	≤ 42 V (**SELV**)	**Class III**	Not classified
≤ 42 V (**ELV**)	≤ 42 V (**ELV**)	**Class I** or **II**	Not classified
> 42 V and ≤ 60 V (≤75 V during charging mode) (**BLV**);		**Class I** or **II**	**BLV**; special conditions apply as given in normative Annex B.
> 60 V (> 75 V during charging mode)	> 42 V	**Class I** or **II**	Not classified

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Mains supplied and battery powered machines for indoor use intended for dry cleaning only shall be at least IPX0. Other machines shall be at least IPX3.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Modification:*

Replace the fourth dashed item as follows:

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

Addition:

Machines shall be marked in addition with the following:

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

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

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

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

– **GVW** of the machine, in kg;

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– the symbol indicating the **maximum cleaning gradeability**, with the value of x.

NOTE 103 I.e. the machine might be able to drive on a higher gradient (**maximum transport gradeability**). This additional information can be given also in the instructions for use.

Machines intended to be used indoors and powered by internal combustion engines shall be marked in addition 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

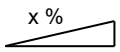
– **rated voltage** or **rated voltage range** in volts;
– **rated power input** in watts;
– name, trademark or identification mark of the manufacturer or responsible vendor;
– model or type reference;
– mass of the most usual configuration in kg.

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:*

		**maximum cleaning gradeability** 'x'
	[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).

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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 **GVW** of the machine in kilograms;

– the transportation weight of the machine in kilograms, which includes the batteries but excludes options (e.g. driver cabin, FOPS, second and third side broom, front mounted sweeping attachment for scrubbers), fresh water (in case of scrubbers or combined machines), and the weight of a standard **operator** (75 kg);

– 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 suction nozzles, spray bars, 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 **GVW**;

– 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 (such as flat tire or component failure);

– 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. If applicable, they shall 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;

– information on the seat adjustment and related parts;

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

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For machines having a **traction drive** and a **GVW** exceeding 100 kg, the instructions shall also include the substance of the following:

– in order to prevent unauthorized use of the machine, the power source shall be switched off or locked, for example by removing the key of the main switch or the ignition key.

For machines with a **traction drive** that are designed to be used on **slopes**, the instructions shall also include the substance of the following:

– machines left unattended shall be secured against unintentional movement.

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 either:

– 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 Always ensure that the safety support is installed before working beneath hopper.
– 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, by removing the ignition key and by disconnecting the battery.

  NOTE 1 Where no ignition key and no battery exist, the disconnection can be achieved by equivalent means.
– WARNING Do not use for cleaning purposes on surfaces having a gradient exceeding that marked on the machine.

If the machine is marked for use on surfaces having a gradient up to and including 2 %, this warning can be replaced by the following:

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– WARNING Do not use on **slopes**.

Instructions for **ride-on machines** fitted with hazardous exposed moving side brushes shall also include the substance of the following:

– WARNING Always ensure that the warning light is switched on when the hazardous exposed side brushes are moving.

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.

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 **ride-on machines** shall also include the substance of the following, if applicable:

– WARNING Do not use the machine without a falling object protective structure (FOPS) in areas where it is likely that the operator is hit by falling objects.

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 DD.2.7.

7.12.103 Information on vibration

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

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Addition after the first paragraph:

For **BLV** circuits, electric shock hazard is considered to exist only between parts of opposite polarity.

Addition after the second paragraph:

Battery connectors *are not tested according 8.1.1 to 8.1.3, but, according to 8.1.101.*

8.1.4 *Addition after "or":*

– the part is supplied with **BLV** and it shall be prevented, by at least basic insulation, to have two conductive, simultaneously accessible parts where the voltage between them is hazardous unless they are provided with protective impedance; or

8.1.101 Battery connectors for BLV

Test probe A of IEC 61032 is applied with a force not exceeding 1 N, the **battery connector** being unplugged. Through openings, the test probe is applied to any depth that the probe will permit during and after insertion to any position. It shall not be possible to touch **BLV** parts with the probe.

Test probe B of IEC 61032 is applied with a force not exceeding 1 N, the **battery connector** being unplugged. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 20 N. If the probe then enters the opening, the test is repeated with the probe in the angled position. It shall only be possible to touch **BLV** parts if the touchable contact surface does not exceed 5 cm^2.

Test probe B of IEC 61032 is applied with a force not exceeding 1 N, the **battery connector** being plugged in. Through openings, the test probe is applied to any depth that the probe will permit and is rotated or angled before, during and after insertion to any position. If the opening does not allow the entry of the probe, the force on the probe in the straight position is increased to 20 N. If the probe then enters the opening, the test is repeated with the probe in the angled position. It shall not be possible to touch **BLV** parts with the probe.

Materials providing insulation from electric shock shall be adequate.

Compliance is checked by subjecting the insulating material to an electric strength test as specified in 16.3. This provision does not exclude the testing of the material as situated within the machine, providing care is taken to ensure that materials not under consideration are not subjected to the test voltage.

This test applies only to materials which, if they were to fail to insulate, would subject the user to a shock hazard from a **hazardous voltage**. This test does not apply to materials that provide only a physical barrier to contact. As such, an uninsulated energized part shall be within 1,0 mm of the material surface to be considered for this requirement.

8.3 *Addition before the last dash:*

This requirement is applicable only for machines having user replaceable **batteries**. If the machine cannot be operated without the **battery**, **basic insulation** shall be provided between **live parts** and the inner surface of the **battery** compartment.

If the machine can be operated without the **battery**, **double insulation** or **reinforced insulation** is not required between **live parts** and the inside surface of the **battery**

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