IEC 60335-2-72

Edition 5.0 2021-07
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 97.080

ISBN 978-2-8322-1003-6

Warning! Make sure that you obtained this publication from an authorized distributor.

® Registered trademark of the International Electrotechnical Commission

CONTENTS

FOREWORD 4
INTRODUCTION 7
1 Scope 8
2 Normative references 9
3 Terms and definitions 10
4 General requirement 14
5 General conditions for the tests 14
6 Classification 15
7 Marking and instructions 15
8 Protection against access to live parts 20
9 Starting of motor-operated appliances 21
10 Power input and current 21
11 Heating 21
12 ~~Void~~ Charging of metal-ion batteries 22
13 Leakage current and electric strength at operating temperature 22
14 Transient overvoltages 22
15 Moisture resistance 22
16 Leakage current and electric strength 24
17 Overload protection of transformers and associated circuits 24
18 Endurance 24
19 Abnormal operation 25
20 Stability and mechanical hazards 26
21 Mechanical strength 31
22 Construction 33
23 Internal wiring 37
24 Components 38
25 Supply connection and external flexible cords 39
26 Terminals for external conductors 40
27 Provision for earthing 40
28 Screws and connections 40
29 Clearances, creepage distances and solid insulation 40
30 Resistance to heat and fire 41
31 Resistance to rusting 41
32 Radiation, toxicity and similar hazards 41
Annexes 47
Annex A (informative) Routine tests 48
~~Annex B (normative) Appliances powered by rechargeable batteries that are recharged in the appliance ..... 57~~
Annex B (normative) Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances 57
Annex L (informative) Guidance for the measurement of clearances and creepage distances 62

~~Annex S (normative) Battery-operated appliances powered by batteries that are non-rechargeable or not recharged in the appliance .....~~

Annex AA (normative) Precast paving slabs 67

Annex BB (normative) Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG) 68

Annex CC (normative) Falling-object protective structures (FOPS) – Dynamic test and performance requirements 71

Annex DD (informative) Emission of acoustical noise 74

Annex EE (informative) Emission of vibration 77

Bibliography 78

Index of defined terms 80

Figure 101 – Impact test apparatus 42

Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses 43

Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses 44

Figure 104 – Configuration of the hose for the freezing treatment 44

Figure 105 – Flexing positions for the hose after removal from the freezing cabinet 45

Figure 106 – Warning symbol: Do not inhale exhaust fumes 45

Figure 107 – Circuit for testing battery chargers (taken from IEC 60335-2-29) 46

Figure CC.1 – Satisfactory protection by the overhead guard 72

Figure CC.2 – Admissible deformation when the overhead guard is supported at all sides 73

Figure CC.3 – Admissible deformation when the overhead guard is supported at one side 73

Table 101 – Machine classification 15

Table 12 – Pull force and torque 40

Table DD.1 – Determination of uncertainty 76

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-72: Particular requirements for floor treatment machines with or without traction drive, 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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-72:2016. 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 60335-2-72 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.

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.

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 2-72: 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 ~~with an artificial surface~~.

~~Their~~ 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 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

– 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);

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

– road sweepers;

NOTE ~~103~~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 ~~104~~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 ~~105~~106 Requirements for fuel-cells are under consideration.

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 62061, *Safety of machinery – Functional safety of safety-related ~~electrical, electronic and programmable electronic~~ 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*

~~IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)* –~~
~~IEC 60529:1989/AMD1:1999~~
~~IEC 60529:1989/AMD2:2013~~

IEC 60335-2-72

Edition 5.0 2021-07

INTERNATIONAL STANDARD

colour inside

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



IEC 60335-2-72:2021-07(en)

CONTENTS

FOREWORD 4
INTRODUCTION 7
1 Scope 8
2 Normative references 9
3 Terms and definitions 10
4 General requirement 14
5 General conditions for the tests 14
6 Classification 15
7 Marking and instructions 15
8 Protection against access to live parts 19
9 Starting of motor-operated appliances 21
10 Power input and current 21
11 Heating 21
12 Charging of metal-ion batteries 21
13 Leakage current and electric strength at operating temperature 21
14 Transient overvoltages 22
15 Moisture resistance 22
16 Leakage current and electric strength 23
17 Overload protection of transformers and associated circuits 24
18 Endurance 24
19 Abnormal operation 24
20 Stability and mechanical hazards 25
21 Mechanical strength 30
22 Construction 32
23 Internal wiring 36
24 Components 37
25 Supply connection and external flexible cords 38
26 Terminals for external conductors 39
27 Provision for earthing 39
28 Screws and connections 39
29 Clearances, creepage distances and solid insulation 39
30 Resistance to heat and fire 40
31 Resistance to rusting 40
32 Radiation, toxicity and similar hazards 40
Annexes 46
Annex A (informative) Routine tests 47
Annex B (normative) Battery-operated appliances, separable batteries and detachable batteries for battery-operated appliances 48
Annex L (informative) Guidance for the measurement of clearances and creepage distances 53
Annex AA (normative) Precast paving slabs 54

Annex BB (normative) Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG) 55
Annex CC (normative) Falling-object protective structures (FOPS) – Dynamic test and performance requirements 58
Annex DD (informative) Emission of acoustical noise 61
Annex EE (informative) Emission of vibration 64
Bibliography 65
Index of defined terms 67

Figure 101 – Impact test apparatus 41
Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses 42
Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses 43
Figure 104 – Configuration of the hose for the freezing treatment 43
Figure 105 – Flexing positions for the hose after removal from the freezing cabinet 44
Figure 106 – Warning symbol: Do not inhale exhaust fumes 44
Figure 107 – Circuit for testing battery chargers (taken from IEC 60335-2-29) 45
Figure CC.1 – Satisfactory protection by the overhead guard 59
Figure CC.2 – Admissible deformation when the overhead guard is supported at all sides 60
Figure CC.3 – Admissible deformation when the overhead guard is supported at one side 60

Table 101 – Machine classification 15
Table 12 – Pull force and torque 39
Table DD.1 – Determination of uncertainty 63

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-72: Particular requirements for floor treatment machines with or without traction drive, 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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

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.

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 2-72: 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);

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*