

This is a preview - click here to buy the full publication



IEC 60335-2-72

Edition 3.0 2012-03

# INTERNATIONAL STANDARD

---

**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

PRICE CODE **XA**

---

ICS 97.080

ISBN 978-2-88912-031-4

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

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	9
3 Terms and definitions .....	10
4 General requirement.....	13
5 General conditions for the tests .....	13
6 Classification.....	13
7 Marking and instructions.....	14
8 Protection against access to live parts.....	18
9 Starting of motor-operated appliances .....	18
10 Power input and current .....	18
11 Heating .....	18
12 Void.....	19
13 Leakage current and electric strength at operating temperature.....	19
14 Transient overvoltages .....	19
15 Moisture resistance .....	19
16 Leakage current and electric strength.....	20
17 Overload protection of transformers and associated circuits .....	21
18 Endurance.....	21
19 Abnormal operation .....	21
20 Stability and mechanical hazards .....	22
21 Mechanical strength .....	27
22 Construction.....	29
23 Internal wiring.....	34
24 Components .....	34
25 Supply connection and external flexible cords .....	34
26 Terminals for external conductors.....	35
27 Provision for earthing .....	36
28 Screws and connections.....	36
29 Clearances, creepage distances and solid insulation .....	36
30 Resistance to heat and fire.....	36
31 Resistance to rusting.....	36
32 Radiation, toxicity and similar hazards.....	36
Annexes .....	41
Annex B (normative) Appliances powered by rechargeable batteries.....	42
Annex AA (normative) Precast paving slabs.....	48
Annex BB (normative) Requirements for internal combustion engine powered machines using liquefied petroleum gas (LPG) .....	49
Annex CC (normative) Falling-object protective structures (FOPS) – Dynamic test and performance requirements .....	52

Annex DD (informative) Emission of acoustical noise.....	55
Annex EE (informative) .....	58
Bibliography.....	59
Figure 101 – Impact test apparatus.....	37
Figure 102 – Apparatus for testing the abrasion resistance of current-carrying hoses .....	38
Figure 103 – Apparatus for testing the resistance to flexing of current-carrying hoses .....	39
Figure 104 – Configuration of the hose for the freezing treatment .....	39
Figure 105 – Flexing positions for the hose after removal from the freezing cabinet.....	40
Figure 106 – Warning symbol: Do not inhale exhaust fumes .....	40
Figure B.101 – Forms of constructions for cleaning machines covered by Annex B.....	43
Figure B.102 – Circuit for testing battery chargers (taken from IEC 60335-2-29).....	47
Figure CC.1 – Satisfactory protection by the overhead guard.....	53
Figure CC.2 – Admissible deformation when the overhead guard is supported at all sides.....	54
Figure CC.3 – Admissible deformation when the overhead guard is supported at one side .....	54
Table 12 – Pull force and torque .....	35
Table DD.1 – Determination of uncertainty.....	57

## 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.

International Standard 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.

This third edition cancels and replaces the second edition published in 2002 and its Amendment 1 (2005). It constitutes a technical revision.

The principal changes in this edition as compared with the second edition of IEC 60335-2-72 are as follows (minor changes are not listed):

The standard has been revised completely and changed significantly, in particular with regard to the following clauses:

- the title has been changed for better distinction with regard to IEC 60335-2-67;
- the scope has been revised editorially to avoid misunderstandings;
- Clause 3 has been revised with regard to the requirements revised;
- the standard has been revised in general and updated regarding state-of-the-art, as far as necessary, in particular some changes have been made to Clauses 15, 22, and 25;
- the markings and instructions (Clause 7) have been revised basically;
- a new Annex DD 'Emission of acoustical noise' was added; and
- a new Annex EE 'Emission of vibration' was added.

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

FDIS	Report on voting
61J/491/FDIS	61J/500/RVD

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

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

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

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for 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.

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

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

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

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

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

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

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

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

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

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

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

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

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

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

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

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

## HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

### Part 2-72: 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 International Standard 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 cleaning motion 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.

They 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 powered machines may be equipped with a built-in battery charger.

This standard does not apply to

- floor treatment appliances for household use according to IEC 60335-2-10;
- floor treatment machines for **commercial use** according to 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);
- road sweepers;

NOTE 103 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 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.).

## 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*

ISO 3411, *Earth moving machinery – Human 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, *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 60068-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*