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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Safety – Part 2-4: Particular requirements for spin extractors

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. 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 60335-2-4:2021. 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 60335-2-4 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This eighth edition cancels and replaces the seventh edition published in 2021. This edition constitutes a technical revision.

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

a) alignment with IEC 60335-1:2020;
b) conversion of some notes to normative text (20.103, 20.104, 22.101);
c) addition of test probe 19 for accessibility of live parts and moving parts (8.1.1, 20.2);
d) addition of accessible surface temperature limits (11.3, 11.8);
e) specified operating conditions for battery operated appliances (B.11.1).

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

Draft	Report on voting
61/7014/FDIS	61/7078/RVD

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.

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.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. 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 spin extractors.

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.

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, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can 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.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

https://www.iec.ch/tc61/supportingdocuments

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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~~ can 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~~ Horizontal publications, basic safety publications and group safety publications 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 which 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.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

– IEC standards published by TC 59 concerning methods of measuring performance;
– CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
– CISPR 14-2 concerning electromagnetic immunity;
– IEC standards published by TC 111 concerning environmental matters.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-4: Particular requirements for spin extractors

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of:

– stand-alone electric spin extractors, and

– spin extractors incorporated in washing machines that have separate containers for washing and spin extraction

for household and similar purposes that have a capacity not exceeding 10 kg of dry cloth and a drum peripheral speed not exceeding 50 m/s, their **rated voltages** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**.

Appliances not intended for normal household use but which nevertheless ~~may~~ can be a source of danger to the public, such as spin extractors intended to be used by laymen in shops, in light industry and on farms and spin extractors for communal use in blocks of flats or in launderettes, are within the scope of this standard.

As far as is practicable, this standard deals with the ~~common~~ reasonably foreseeable hazards presented by appliances that are encountered by all persons ~~in and around the home~~. However, in general, it does not take into account:

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;

– children playing with the appliance.

Attention is drawn to the fact that:

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;

– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

This standard does not apply to:

– appliances intended exclusively for industrial purposes;

– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60730-2-12:2015, *Automatic electrical controls – Part 2-12: Particular requirements for electrically operated door locks*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 ~~*Replacement*~~ *Modification:*

Replace the first paragraph with the following:

~~**normal operation**~~
operation of the appliance under the following conditions:

The drum is filled with textile material having a mass in the dry condition equal to the maximum mass specified in the instructions. The textile material consists of pre-washed double hemmed cotton sheets having dimensions of approximately 700 mm × 700 mm and a specific mass between 140 g/m^2 and 175 g/m^2 in the dry condition. It is saturated with water before being evenly distributed in the drum.

~~**3.6 Definitions relating to parts of an appliance**~~

~~**3.6.3** *Replacement:*~~

~~**accessible part**~~
~~part or surface that can be touched by means of test probe B and test probe 18 of IEC 61032:1997, and if the part or surface is metal, any conductive part connected to it~~

~~Note to entry: **Accessible non-metallic parts** with conductive coatings are considered to be **accessible metal parts**.~~

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

The tests of 21.101, 21.102 and 22.101 shall be carried out on the same appliance as that used for the test of Clause 18.

5.3 *Addition:*

The tests of 21.101 and 21.102 are carried out before the test of Clause 18. The test of 22.101 is carried out after the test of Clause 18.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification*:

Replace the first paragraph with the following:

Appliances shall be **class I**, **class II** or **class III**.

6.2 *Addition:*

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.10 *Addition*:

If the **off position** is only indicated by letters, the word "off" shall be used.

7.12 *Addition*:

The instructions shall specify the maximum mass of dry cloth in kilograms to be used in the appliance.

7.12.1 *Addition*:

If the label specified in 7.101 is supplied with the appliance, the installation instructions shall state that it has to be permanently fixed to the wall close to the appliance.

For appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, the installation instructions shall state that a device for switching off the appliance automatically is not to be installed in the supply circuit.

7.101 Appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, shall be supplied with a label that states the substance of the following, unless the instruction is marked on the appliance:

> This spin extractor has to be connected to the supply mains before the lid can be opened. Do not force it open.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

~~*Test probe 18 of IEC 61032:1997 is applied with a force not exceeding 1 N, the appliance being in every possible position, except that appliances normally used on the floor and having a mass exceeding 40 kg are not tilted. 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 10 N. If the probe then enters the opening, the test is repeated with the probe in the angled position. The appliance shall be fully assembled as in normal use without removing any parts that are intended to be removed for* **user maintenance**.~~

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18. Test probe 19 is not applied to appliances for communal use in blocks of flats or in launderettes.

~~**8.1.5** *Addition:*~~

~~*Test probe 18 as specified in 8.1.1 is not used.*~~

~~**8.2** *Addition:*~~

~~*Compliance is also checked by applying test probe 18 of IEC 61032:1997 in accordance with the conditions specified in 8.1.1. The test probe is applied to* **built-in appliances** *and* **fixed appliances** *only after installation.*~~

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 *Addition:*

Where the external ***accessible surfaces*** *are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external* ***accessible surfaces*** *specified in Table 101. The probe is applied with a force of 4 N ± 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

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

11.7 ~~*Replacement*~~ *Modification*:

Replace the first paragraph with the following:

Appliances are operated for five periods of water extraction, the periods being separated by a rest period. Each rest period, which includes the braking time, has a duration of 1 min for each

kilogram of dry textile material or 4 min, whichever is longer. During the rest period, the textile material is re-saturated with water.

For appliances incorporating a programmer or timer, the water extraction period is the maximum allowed by the control.

For other appliances, the water extraction period has a duration of:

– *15 min for continuous-flow rinsing appliances;*

– *5 min for other appliances.*

If a longer period is indicated in the instructions, this period applies instead.

Replace the first dashed item of the third paragraph with the following:

*– the **battery** that has been **fully discharged** is charged for 1 h, while the appliance is operated as specified performing its intended function, if allowed by the construction of the appliance.*

11.8 *Modification:*

Replace the first paragraph with the following:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

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

Surface	*Temperature rise of external accessible surfaces* [a, c] K		
	Surfaces of appliances situated not more than 850 mm above the floor after installation		*Surfaces situated more than 850 mm above the floor after installation* [b]
	Front surfaces	*Other surfaces* [b]	
Bare metal	38	42	42
Coated metal [d]	42	49	49
Glass and ceramic	51	56	56
Plastic and plastic coating > 0,4 mm [e, f]	58	62	62

NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

[a] *Temperature rises are not measured on the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end.*

[b] *If these values are exceeded, the test is allowed to be repeated with the appliance moved away from the test corner wall. The test is repeated for 1 cycle.*

[c] *For surfaces within 25 mm from air outlets, the values may be increased by 10 K.*

[d] *Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.*

[e] *The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.*

[f] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*

12 ~~Void~~ Charging of metal-ion batteries

This clause of Part 1 is applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Addition*:

*The inlet to the discharge pump or to the gravity drain is blocked. The drum is filled as specified for **normal operation**, the mass of water being twice the mass of the dry textile material. Any water remaining after the saturation process is poured into the appliance, which is supplied at **rated voltage** and operated for 1 min or the maximum period allowed by the programmer or timer, whichever is shorter.*

*In addition, continuous-flow rinsing appliances having a vertical axis are completely filled with saturated textile material and 10 l of water is poured in over a period of 20 s. The appliance is then operated while supplied at **rated voltage**.*

For all appliances, 0,5 l of the solution is poured rapidly over the top of the appliance in the most unfavourable way so that the spillage solution also flows over the surface of the appliance that incorporates controls and other places where it ~~may~~ can penetrate the appliance enclosure, the controls being placed in the most unfavourable position. The controls are then operated through their working range, this operation being repeated after 5 min.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is replaced by the following.

Appliances having lids that can be opened while the drum is rotating shall be constructed so that braking mechanisms and lid interlocks withstand the stresses to which they ~~may~~ can be exposed in normal use.

Compliance is checked by the following test.

*The appliance is supplied at 1,06 times **rated voltage** and operated under **normal operation** until the motor has reached its maximum speed.*

The lid is then fully opened. The test is repeated after the drum has been at rest for a period long enough to ensure that the appliance does not attain an excessive temperature according to Table 3.

The test is carried out

– *for braking mechanisms:*
  - *3 500 times for separate spin extractors;*
  - *1 000 times for spin extractors incorporated in washing machines;*
– *for lid interlocks, 6 000 times.*

The textile material is re-saturated with water at least every 250 times.

After the test, the appliance shall be fit for further use and compliance with this standard shall not be impaired.

NOTE 101 Forced cooling can be used to prevent excessive temperatures and to shorten the test.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.7 Not applicable.

19.9 Not applicable.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

*The drum is empty, or filled as specified for **normal operation**, whichever is more unfavourable.*

20.2 *Addition:*

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18. Test probe 19 is not applied to appliances for communal use in blocks of flats or in launderettes.

20.101 Appliances shall not be adversely affected by an unbalanced load.

Compliance is checked by the following test.

The appliance is placed on a horizontal support and a load having a mass of 0,2 kg or 10 % of the maximum mass of textile material specified in the instructions, whichever is higher, is fixed to the inside wall of the drum half-way along its length.

*The appliance is supplied at **rated voltage** and operated for 5 min or the maximum period allowed by a programmer or timer, whichever is shorter.*

The test is carried out four times, the load being moved each time through an angle of 90° around the wall of the drum.

*If compliance relies on the operation of an **electronic circuit**, the test is repeated with the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**.*

The appliance shall not overturn and the drum shall not hit other parts except the enclosure.

After the test, the appliance shall be fit for further use.

20.102 The lid or door shall be interlocked so that the appliance can only be operated when the lid or door is in the closed position.

Compliance is checked by inspection, by manual test and by the following test.

Test probe B of IEC 61032~~:1997~~ is applied with a force of 5 N and test probe 18 of IEC 61032 is applied with a force of 2,5 N in order to try and release any interlock that is needed to comply with the requirement. The interlock shall not release.

20.103 For appliances having a drum with a rotational kinetic energy exceeding 1 500 J, or

– for appliances having a single lid, a maximum peripheral speed exceeding 20 m/s,
– for appliances incorporating two lids, a maximum peripheral speed exceeding 25 m/s,

it shall not be possible to open the lid while the drum is in motion.

Compliance is checked by inspection, by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy and by the following test.

*The appliance is supplied at **rated voltage** and operated empty. The force determined during the test of 22.101 with the lid interlocked is applied to the lid in an attempt to open it.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

– *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*
– *the electromagnetic phenomena tests of 19.11.4.1 to 19.11.4.6 applied to the appliance. The tests are carried out with surge protective devices disconnected, unless they incorporate spark gaps.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

– *the lid or door does not move automatically to an open position when the interlock is released; and*
– *the appliance will not restart after the cycle in which the interlock was released.*

It shall not be possible to open the lid while the drum is in motion.

If the drum is not cylindrical, the peripheral speed is the mean peripheral speed.

~~NOTE~~ The rotational kinetic energy is calculated from the following formula:

$$E = \frac{mv^2}{4}$$

where

E is the rotational kinetic energy, in J;

m is the mass of the cloth specified in the instructions for use, in kg;

v is the maximum peripheral speed of the drum, in m/s.

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

20.104 For appliances having a drum with a rotational kinetic energy not exceeding 1 500 J and

– for appliances having a single lid, a maximum peripheral speed not exceeding 20 m/s,

– for appliances incorporating two lids, a maximum peripheral speed not exceeding 25 m/s,

moving parts shall not be accessible while the motor is energized or when the drum speed exceeds 60 r/min.

The braking system shall not be affected by the penetration of water.

Compliance is checked by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy in accordance with the formula in 20.103 and by the following test, which is carried out after repeating the spillage test of 15.2.

~~NOTE The rotational kinetic energy is calculated in accordance with the formula in 20.103.~~

*The appliance is supplied at **rated voltage** and operated empty. For appliances having a single lid and for appliances incorporating two lids where the second lid does not open independently of the first lid, the lid or first lid as appropriate is gradually opened and*

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032~~:1997~~;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, test probe B of IEC 61032~~:1997~~ and test probe 18 of IEC 61032 are applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm, the motor shall be disconnected from the supply and within 7 s, the drum speed shall not exceed 60 r/min.*

For appliances incorporating two lids where the second lid opens independently of the first lid, the first lid is gradually opened and with an opening greater than 50 mm, the motor shall be disconnected from the supply and within 2 s the drum speed shall not exceed 20 m/s.

The second lid is gradually opened and

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032~~:1997~~;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, test probe B of IEC 61032~~:1997~~ and test probe 18 of IEC 61032 are applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm and within 7 s, the drum speed shall not exceed 60 r/min.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

– *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*

– *the electromagnetic phenomena tests of 19.11.4.2 and 19.11.4.5 applied in turn to the appliance. The tests are carried out with surge protective devices disconnected, unless they incorporate spark gaps.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

– *the lid or door does not move automatically to an open position when the interlock is released; and*
– *the appliance will not restart after the cycle in which the interlock was released.*

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

20.105 Protective devices fitted in the upper part of spin extractors having a vertical axis shall be positioned or protected so that the device is not likely to be damaged by textile material that ~~may~~ can escape from the drum in normal use.

Compliance is checked by inspection.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.101 Lids of appliances shall have adequate mechanical strength.

Compliance is checked by the following test.

A rubber hemisphere having a diameter of 70 mm and a hardness between 40 IRHD and 50 IRHD is fixed to a cylinder having a mass of 20 kg and dropped from a height of 100 mm onto the centre of the lid.

The test is carried out three times, after which the lid shall not be damaged to the extent that ~~it is possible to touch moving parts with test probe B and test probe 18~~ compliance with 20.2 is impaired.

21.102 Lids and their hinges shall have adequate resistance to distortion.

Compliance is checked by the following test.

A force of 50 N is applied to the open lid in the most unfavourable direction and position.

The test is carried out three times, after which the hinges shall not have worked loose and the appliance shall not be damaged or deformed to such an extent that compliance with the appropriate requirements of 20.102 to 20.104 is impaired.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 Interlocks required for compliance with Clause 20 shall be constructed so that lids or doors are unlikely to be forced open in normal use.

Compliance is checked by the following test.

The lid or door is opened manually as in normal use, the force applied being measured. The lid or door is closed and interlocked. An attempt is then made to open the lid or door in the same way.

It shall not be possible to force open the lid or door with a force less than 10 times the value originally measured, with a minimum of 50 N.

~~NOTE The test is not carried out if the interlock is not required for compliance with Clause 20.~~

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 *Modification*:

The number of cycles of operation for timers is increased to 10 000.

Addition:

For lid interlocks, the number of cycles of operation declared for IEC 60730-2-12:2015, 6.10 and 6.11 shall not be less than 6 000.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

Replace the two dashed items in the compliance criteria with the following:

– *for spin extractors, 30.2.2 is applicable.*

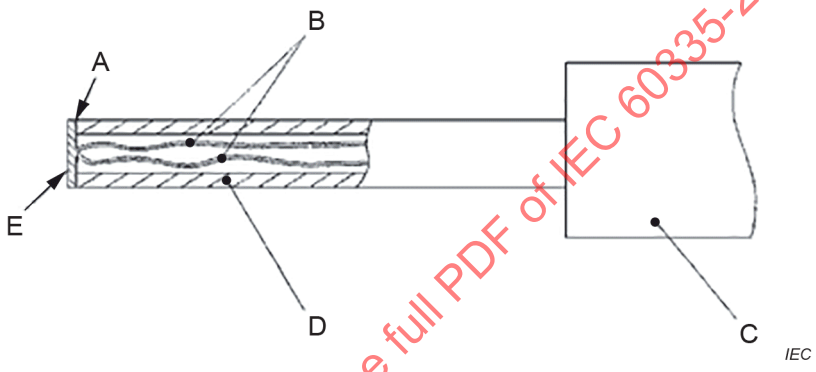
~~**30.2.3** Not applicable.~~

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

C handle arrangement permitting a contact force of 4 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

Figure 101 – Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

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

B.11.1 *Replacement:*

Battery-operated appliances *are tested under the conditions of* ***normal operation****.*

For appliances operated with ***detachable batteries*** *or* ***separable batteries*** *that are disconnected from the appliance for charging purposes, the appliance is operated as specified in 11.7 until it completes the duration of the test as specified or it no longer operates due to depletion of the* ***battery****. If the battery is depleted before the appliance completes the duration of the test, the depleted* ***battery*** *is immediately replaced with another* ***battery*** *that is* ***fully charged****, the* ***battery*** *being the model or type reference of the* ***battery*** *provided or indicated in the instructions. The test is continued until the appliance completes the duration of the test as specified or it no longer operates due to depletion of the* ***battery****.*

For appliances incorporating ***integral batteries*** *or* ***separable batteries*** *not disconnected from the appliance for charging purposes, and that cannot perform their intended function while the* ***batteries*** *are being charged, the appliance is operated as specified in 11.7 until the tests are completed or until it cannot perform its intended function due to the depletion of the* ***batteries****.*

For appliances operated with ***batteries*** *that are replaceable or* ***non-rechargeable batteries****, the appliance is operated as specified in 11.7 until the minimum capacity of the* ***battery*** *as specified in Table B.1 has been delivered or until the tests specified in 11.7 have been completed, whichever occurs first.*

B.22.3 *Addition:*

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

B.22.4 *Addition:*

For parts of ***batteries*** *situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

Annex C
(normative)

Ageing test on motors

Modification:

The value of p in Table C.1 is 2 000.

Annex R
(normative)

Software evaluation

R.2.2.5 *Modification:*

Replace the first paragraph with the following:

For programmable **electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, detection of a fault/error shall occur before compliance with Clause 19, 20.103 ~~and~~ or 20.104 is impaired.

R.2.2.9 *Modification:*

Replace the first sentence of the first paragraph with the following:

The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19, 20.103 ~~and~~ or 20.104 is impaired.

Bibliography

The bibliography of Part 1 is applicable.

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IEC 60335-2-4

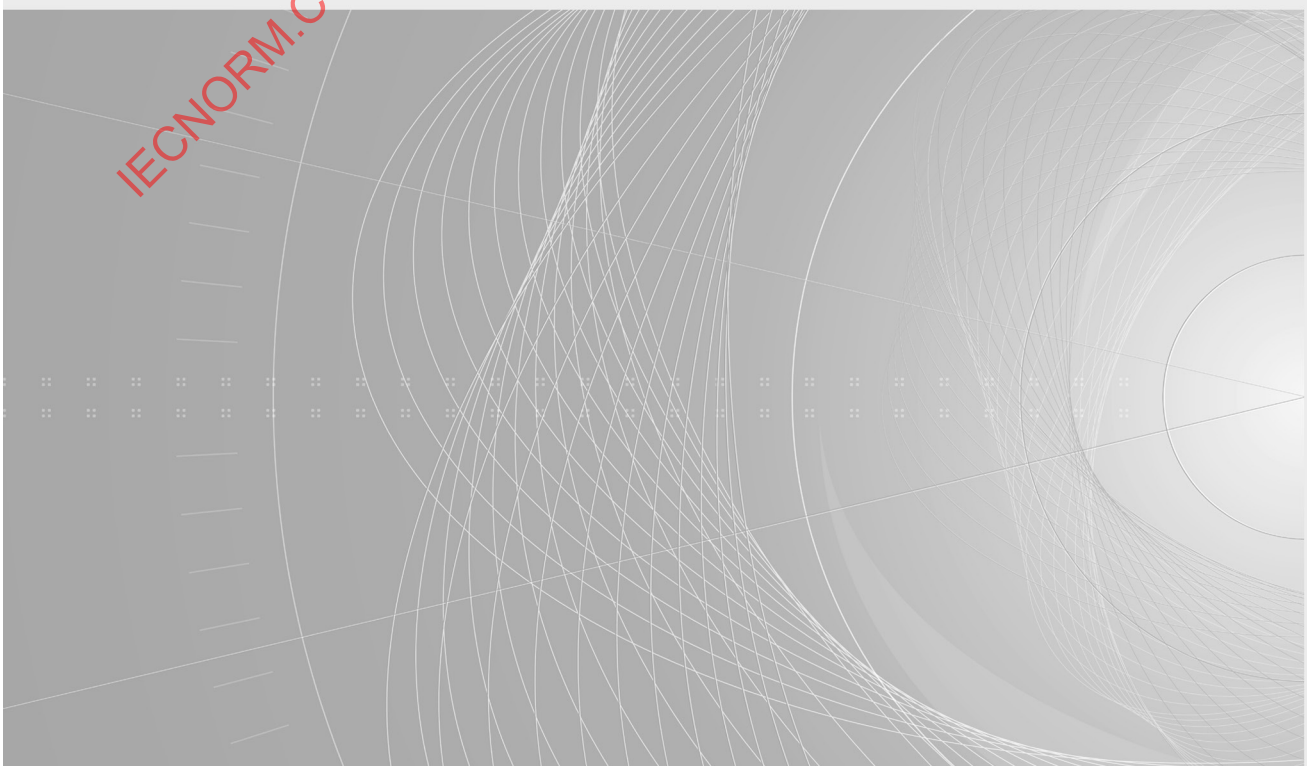
Edition 8.0 2023-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical appliances – Safety – Part 2-4: Particular requirements for spin extractors

Appareils électrodomestiques et analogues – Sécurité – Partie 2-4: Exigences particulières pour les essoreuses centrifuges



IEC 60335-2-4:2023-12(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-4: Particular requirements for spin extractors

FOREWORD

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IEC 60335-2-4 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This eighth edition cancels and replaces the seventh edition published in 2021. This edition constitutes a technical revision.

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

a) alignment with IEC 60335-1:2020;
b) conversion of some notes to normative text (20.103, 20.104, 22.101);
c) addition of test probe 19 for accessibility of live parts and moving parts (8.1.1, 20.2);
d) addition of accessible surface temperature limits (11.3, 11.8);

e) specified operating conditions for battery operated appliances (B.11.1).

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

Draft	Report on voting
61/7014/FDIS	61/7078/RVD

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.

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.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. 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 spin extractors.

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.

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, or
- revised.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can 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.

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.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website

https://www.iec.ch/tc61/supportingdocuments

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

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 can 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 publications, basic safety publications and group safety publications 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.

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 which 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.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

– IEC standards published by TC 59 concerning methods of measuring performance;
– CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
– CISPR 14-2 concerning electromagnetic immunity;
– IEC standards published by TC 111 concerning environmental matters.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-4: Particular requirements for spin extractors

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of:

– stand-alone electric spin extractors, and

– spin extractors incorporated in washing machines that have separate containers for washing and spin extraction

for household and similar purposes that have a capacity not exceeding 10 kg of dry cloth and a drum peripheral speed not exceeding 50 m/s, their **rated voltages** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**.

Appliances not intended for normal household use but which nevertheless can be a source of danger to the public, such as spin extractors intended to be used by laymen in shops, in light industry and on farms and spin extractors for communal use in blocks of flats or in launderettes, are within the scope of this standard.

As far as is practicable, this standard deals with the reasonably foreseeable hazards presented by appliances that are encountered by all persons. However, in general, it does not take into account:

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;

– children playing with the appliance.

Attention is drawn to the fact that:

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;

– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

This standard does not apply to:

– appliances intended exclusively for industrial purposes;

– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

IEC 60730-2-12:2015, *Automatic electrical controls – Part 2-12: Particular requirements for electrically operated door locks*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Modification:*

Replace the first paragraph with the following:

operation of the appliance under the following conditions:

The drum is filled with textile material having a mass in the dry condition equal to the maximum mass specified in the instructions. The textile material consists of pre-washed double hemmed cotton sheets having dimensions of approximately 700 mm × 700 mm and a specific mass between 140 g/m^2 and 175 g/m^2 in the dry condition. It is saturated with water before being evenly distributed in the drum.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

The tests of 21.101, 21.102 and 22.101 shall be carried out on the same appliance as that used for the test of Clause 18.

5.3 *Addition:*

The tests of 21.101 and 21.102 are carried out before the test of Clause 18. The test of 22.101 is carried out after the test of Clause 18.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification*:

Replace the first paragraph with the following:

Appliances shall be **class I**, **class II** or **class III**.

6.2 *Addition:*

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.10 *Addition*:

If the **off position** is only indicated by letters, the word "off" shall be used.

7.12 *Addition*:

The instructions shall specify the maximum mass of dry cloth in kilograms to be used in the appliance.

7.12.1 *Addition*:

If the label specified in 7.101 is supplied with the appliance, the installation instructions shall state that it has to be permanently fixed to the wall close to the appliance.

For appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, the installation instructions shall state that a device for switching off the appliance automatically is not to be installed in the supply circuit.

7.101 Appliances intended for communal use in blocks of flats, and having an interlock system that has to be energized in order to release the lid, shall be supplied with a label that states the substance of the following, unless the instruction is marked on the appliance:

> This spin extractor has to be connected to the supply mains before the lid can be opened. Do not force it open.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18. Test probe 19 is not applied to appliances for communal use in blocks of flats or in launderettes.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 *Addition:*

Where the external ***accessible surfaces*** *are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external* ***accessible surfaces*** *specified in Table 101. The probe is applied with a force of 4 N ± 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

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

11.7 *Modification*:

Replace the first paragraph with the following:

Appliances are operated for five periods of water extraction, the periods being separated by a rest period. Each rest period, which includes the braking time, has a duration of 1 min for each kilogram of dry textile material or 4 min, whichever is longer. During the rest period, the textile material is re-saturated with water.

For appliances incorporating a programmer or timer, the water extraction period is the maximum allowed by the control.

For other appliances, the water extraction period has a duration of:

– *15 min for continuous-flow rinsing appliances;*
– *5 min for other appliances.*

If a longer period is indicated in the instructions, this period applies instead.

Replace the first dashed item of the third paragraph with the following:

– the ***battery*** *that has been* ***fully discharged*** *is charged for 1 h, while the appliance is operated as specified performing its intended function, if allowed by the construction of the appliance*.

11.8 *Modification:*

Replace the first paragraph with the following:

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

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

Surface	*Temperature rise of external accessible surfaces* [a, c] *K*		
	Surfaces of appliances situated not more than 850 mm above the floor after installation		*Surfaces situated more than 850 mm above the floor after installation* [b]
	Front surfaces	*Other surfaces* [b]	
Bare metal	38	42	42
Coated metal [d]	42	49	49
Glass and ceramic	51	56	56
Plastic and plastic coating > 0,4 mm [e, f]	58	62	62

NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.

[a] *Temperature rises are not measured on the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end.*

[b] *If these values are exceeded, the test is allowed to be repeated with the appliance moved away from the test corner wall. The test is repeated for 1 cycle.*

[c] *For surfaces within 25 mm from air outlets, the values may be increased by 10 K.*

[d] *Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel, powder or non-substantially plastic coating is used.*

[e] *The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.*

[f] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Addition*:

*The inlet to the discharge pump or to the gravity drain is blocked. The drum is filled as specified for **normal operation**, the mass of water being twice the mass of the dry textile material. Any water remaining after the saturation process is poured into the appliance, which is supplied at **rated voltage** and operated for 1 min or the maximum period allowed by the programmer or timer, whichever is shorter.*

In addition, continuous-flow rinsing appliances having a vertical axis are completely filled with saturated textile material and 10 l of water is poured in over a period of 20 s. The appliance is then operated while supplied at ***rated voltage****.*

For all appliances, 0,5 l of the solution is poured rapidly over the top of the appliance in the most unfavourable way so that the spillage solution also flows over the surface of the appliance that incorporates controls and other places where it can penetrate the appliance enclosure, the controls being placed in the most unfavourable position. The controls are then operated through their working range, this operation being repeated after 5 min.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is replaced by the following.

Appliances having lids that can be opened while the drum is rotating shall be constructed so that braking mechanisms and lid interlocks withstand the stresses to which they can be exposed in normal use.

Compliance is checked by the following test.

The appliance is supplied at 1,06 times ***rated voltage*** *and operated under* ***normal operation*** *until the motor has reached its maximum speed.*

The lid is then fully opened. The test is repeated after the drum has been at rest for a period long enough to ensure that the appliance does not attain an excessive temperature according to Table 3.

The test is carried out

– *for braking mechanisms:*
  - *3 500 times for separate spin extractors;*
  - *1 000 times for spin extractors incorporated in washing machines;*
– *for lid interlocks, 6 000 times.*

The textile material is re-saturated with water at least every 250 times.

After the test, the appliance shall be fit for further use and compliance with this standard shall not be impaired.

NOTE 101 Forced cooling can be used to prevent excessive temperatures and to shorten the test.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.7 Not applicable.

19.9 Not applicable.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

*The drum is empty, or filled as specified for **normal operation**, whichever is more unfavourable.*

20.2 *Addition:*

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18. Test probe 19 is not applied to appliances for communal use in blocks of flats or in launderettes.

20.101 Appliances shall not be adversely affected by an unbalanced load.

Compliance is checked by the following test.

The appliance is placed on a horizontal support and a load having a mass of 0,2 kg or 10 % of the maximum mass of textile material specified in the instructions, whichever is higher, is fixed to the inside wall of the drum half-way along its length.

*The appliance is supplied at **rated voltage** and operated for 5 min or the maximum period allowed by a programmer or timer, whichever is shorter.*

The test is carried out four times, the load being moved each time through an angle of 90° around the wall of the drum.

*If compliance relies on the operation of an **electronic circuit**, the test is repeated with the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**.*

The appliance shall not overturn and the drum shall not hit other parts except the enclosure.

After the test, the appliance shall be fit for further use.

20.102 The lid or door shall be interlocked so that the appliance can only be operated when the lid or door is in the closed position.

Compliance is checked by inspection, by manual test and by the following test.

Test probe B of IEC 61032 is applied with a force of 5 N and test probe 18 of IEC 61032 is applied with a force of 2,5 N in order to try and release any interlock that is needed to comply with the requirement. The interlock shall not release.

20.103 For appliances having a drum with a rotational kinetic energy exceeding 1 500 J, or

– for appliances having a single lid, a maximum peripheral speed exceeding 20 m/s,
– for appliances incorporating two lids, a maximum peripheral speed exceeding 25 m/s,

it shall not be possible to open the lid while the drum is in motion.

Compliance is checked by inspection, by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy and by the following test.

*The appliance is supplied at **rated voltage** and operated empty. The force determined during the test of 22.101 with the lid interlocked is applied to the lid in an attempt to open it.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

- *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*
- *the electromagnetic phenomena tests of 19.11.4.1 to 19.11.4.6 applied to the appliance. The tests are carried out with surge protective devices disconnected, unless they incorporate spark gaps.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

- *the lid or door does not move automatically to an open position when the interlock is released; and*
- *the appliance will not restart after the cycle in which the interlock was released.*

It shall not be possible to open the lid while the drum is in motion.

If the drum is not cylindrical, the peripheral speed is the mean peripheral speed.

The rotational kinetic energy is calculated from the following formula:

$$E = \frac{mv^2}{4}$$

where

E is the rotational kinetic energy, in J;

m is the mass of the cloth specified in the instructions for use, in kg;

v is the maximum peripheral speed of the drum, in m/s.

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

20.104 For appliances having a drum with a rotational kinetic energy not exceeding 1 500 J and

- for appliances having a single lid, a maximum peripheral speed not exceeding 20 m/s,
- for appliances incorporating two lids, a maximum peripheral speed not exceeding 25 m/s,

moving parts shall not be accessible while the motor is energized or when the drum speed exceeds 60 r/min.

The braking system shall not be affected by the penetration of water.

Compliance is checked by measurement of the maximum peripheral speed, by calculation of the rotational kinetic energy in accordance with the formula in 20.103 and by the following test, which is carried out after repeating the spillage test of 15.2.

*The appliance is supplied at **rated voltage** and operated empty. For appliances having a single lid and for appliances incorporating two lids where the second lid does not open independently of the first lid, the lid or first lid as appropriate is gradually opened and*

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, test probe B of IEC 61032 and test probe 18 of IEC 61032 are applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm, the motor shall be disconnected from the supply and within 7 s, the drum speed shall not exceed 60 r/min.*

For appliances incorporating two lids where the second lid opens independently of the first lid, the first lid is gradually opened and with an opening greater than 50 mm, the motor shall be disconnected from the supply and within 2 s the drum speed shall not exceed 20 m/s.

The second lid is gradually opened and

– *with an opening of 4 mm to 10 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with the test probe 12 of IEC 61032;*

– *with an opening greater than 10 mm, but not more than 12 mm, it shall not be possible to touch parts rotating at a speed exceeding 60 r/min with a test rod 3 mm in diameter and 120 mm long. In addition, test probe B of IEC 61032 and test probe 18 of IEC 61032 are applied and shall not come within a distance of 20 mm from the rotating parts;*

– *with an opening greater than 12 mm and within 7 s, the drum speed shall not exceed 60 r/min.*

*If compliance relies on the operation of an **electronic circuit**, the test is repeated under the following conditions applied separately:*

– *the fault conditions in a) to g) of 19.11.2 applied one at a time to the **electronic circuit**;*

– *the electromagnetic phenomena tests of 19.11.4.2 and 19.11.4.5 applied in turn to the appliance. The tests are carried out with surge protective devices disconnected, unless they incorporate spark gaps.*

In an appliance containing lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that the following conditions are fulfilled:

– *the lid or door does not move automatically to an open position when the interlock is released; and*

– *the appliance will not restart after the cycle in which the interlock was released.*

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

20.105 Protective devices fitted in the upper part of spin extractors having a vertical axis shall be positioned or protected so that the device is not likely to be damaged by textile material that can escape from the drum in normal use.

Compliance is checked by inspection.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.101 Lids of appliances shall have adequate mechanical strength.

Compliance is checked by the following test.

A rubber hemisphere having a diameter of 70 mm and a hardness between 40 IRHD and 50 IRHD is fixed to a cylinder having a mass of 20 kg and dropped from a height of 100 mm onto the centre of the lid.

The test is carried out three times, after which the lid shall not be damaged to the extent that compliance with 20.2 is impaired.

21.102 Lids and their hinges shall have adequate resistance to distortion.

Compliance is checked by the following test.

A force of 50 N is applied to the open lid in the most unfavourable direction and position.

The test is carried out three times, after which the hinges shall not have worked loose and the appliance shall not be damaged or deformed to such an extent that compliance with the appropriate requirements of 20.102 to 20.104 is impaired.

22 Construction

This clause of Part 1 is applicable except as follows.

22.101 Interlocks required for compliance with Clause 20 shall be constructed so that lids or doors are unlikely to be forced open in normal use.

Compliance is checked by the following test.

The lid or door is opened manually as in normal use, the force applied being measured. The lid or door is closed and interlocked. An attempt is then made to open the lid or door in the same way.

It shall not be possible to force open the lid or door with a force less than 10 times the value originally measured, with a minimum of 50 N.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 *Modification*:

The number of cycles of operation for timers is increased to 10 000.

Addition:

For lid interlocks, the number of cycles of operation declared for IEC 60730-2-12:2015, 6.10 and 6.11 shall not be less than 6 000.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

Replace the two dashed items in the compliance criteria with the following:

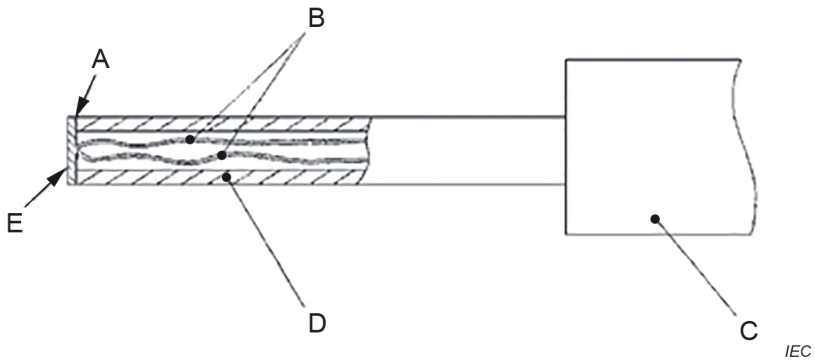
– *for spin extractors, 30.2.2 is applicable.*

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

C handle arrangement permitting a contact force of 4 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

Figure 101 – Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

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

B.11.1 *Replacement:*

Battery-operated appliances *are tested under the conditions of* ***normal operation****.*

For appliances operated with ***detachable batteries*** *or* ***separable batteries*** *that are disconnected from the appliance for charging purposes, the appliance is operated as specified in 11.7 until it completes the duration of the test as specified or it no longer operates due to depletion of the* ***battery****. If the battery is depleted before the appliance completes the duration of the test, the depleted* ***battery*** *is immediately replaced with another* ***battery*** *that is* ***fully charged****, the* ***battery*** *being the model or type reference of the* ***battery*** *provided or indicated in the instructions. The test is continued until the appliance completes the duration of the test as specified or it no longer operates due to depletion of the* ***battery****.*

For appliances incorporating ***integral batteries*** *or* ***separable batteries*** *not disconnected from the appliance for charging purposes, and that cannot perform their intended function while the* ***batteries*** *are being charged, the appliance is operated as specified in 11.7 until the tests are completed or until it cannot perform its intended function due to the depletion of the* ***batteries****.*

For appliances operated with ***batteries*** *that are replaceable or* ***non-rechargeable batteries****, the appliance is operated as specified in 11.7 until the minimum capacity of the* ***battery*** *as specified in Table B.1 has been delivered or until the tests specified in 11.7 have been completed, whichever occurs first.*

B.22.3 *Addition:*

For parts of appliances situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.

B.22.4 *Addition:*

For parts of ***batteries*** *situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

Annex C
(normative)

Ageing test on motors

Modification:

The value of p in Table C.1 is 2 000.

Annex R
(normative)

Software evaluation

R.2.2.5 *Modification:*

Replace the first paragraph with the following:

For programmable **electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1 or Table R.2, detection of a fault/error shall occur before compliance with Clause 19, 20.103 or 20.104 is impaired.

R.2.2.9 *Modification:*

Replace the first sentence of the first paragraph with the following:

The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19, 20.103 or 20.104 is impaired.

Bibliography

The bibliography of Part 1 is applicable.

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SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-4: Exigences particulières pour les essoreuses centrifuges

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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L'IEC 60335-2-4 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette huitième édition annule et remplace la septième édition parue en 2021. Cette édition constitue une révision technique.

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

a) le texte a été aligné sur l'IEC 60335-1:2020;

b) certaines notes ont été converties en texte normatif (20.103, 20.104, 22.101);

c) le calibre d'essai 19 a été ajouté pour l'accès aux parties actives et aux parties mobiles (8.1.1, 20.2);

d) des limites de température ont été ajoutées pour les surfaces accessibles (11.3, 11.8);

e) des conditions de fonctionnement ont été spécifiées pour les appareils alimentés par batteries (B.11.1).

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

Projet	Rapport de vote
61/7014/FDIS	61/7078/RVD

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

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

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

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

La présente partie 2 doit être utilisée conjointement avec la dernière édition de l'IEC 60335-1 et ses amendements sauf si cette édition l'exclut. Dans ce cas, la dernière édition qui n'exclut pas la présente partie 2 est utilisée. Elle a été établie sur la base de la sixième édition (2020) de cette norme.

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

La présente partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences particulières pour les essoreuses centrifuges.

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

NOTE 2 Le système de numérotation suivant est utilisé:

– les paragraphes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101;

– à l'exception de celles qui sont dans un nouveau paragraphe ou de celles qui concernent des notes de la Partie 1, les notes sont numérotées à partir de 101, y compris celles des articles ou paragraphes qui sont remplacés;

– les annexes qui sont ajoutées sont désignées AA, BB, etc.

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

– exigences: caractères romains;

– *modalités d'essais: caractères italiques*;

– notes: petits caractères romains.

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

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

- reconduit,
- supprimé, ou
- révisé.

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

Le comité recommande que le contenu de cette publication soit adopté pour application nationale (obligatoire) au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

INTRODUCTION

Il a été admis par hypothèse, en établissant la présente Norme internationale, que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

Les documents de recommandations concernant l'application des exigences de sécurité pour les appareils peuvent être consultés dans les documents de support du CE 61, accessibles sur le site web de l'IEC à l'adresse:

https://www.iec.ch/tc61/supportingdocuments

Cette information est donnée à l'intention des utilisateurs de la présente Norme internationale et ne constitue nullement un remplacement du texte normatif de la présente norme.

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

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

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

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

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

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

NOTE 2 Les publications horizontales, les publications fondamentales de sécurité et les publications groupées de sécurité couvrant un danger ne s'appliquent pas, parce qu'elles ont été prises en considération lorsque les exigences générales et particulières ont été étudiées pour la série de normes IEC 60335.

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

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

NOTE 3 Les normes traitant des aspects non relatifs à la sécurité des appareils électrodomestiques sont:

– les normes IEC publiées par le comité d'études 59 concernant les méthodes de mesure d'aptitude à la fonction;
– les normes CISPR 11 et CISPR 14-1, ainsi que les normes applicables de la série IEC 61000-3 concernant les émissions électromagnétiques;
– la norme CISPR 14-2 concernant l'immunité électromagnétique;
– les normes IEC publiées par le comité d'études 111 concernant l'environnement.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-4: Exigences particulières pour les essoreuses centrifuges

1 Domaine d'application

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

La présente partie de l'IEC 60335 traite de la sécurité:

– des essoreuses centrifuges électriques indépendantes; et

– des essoreuses centrifuges incorporées à des machines à laver le linge qui comportent des tambours distincts pour le lavage et l'essorage

pour usages domestiques et analogues dont la capacité ne dépasse pas 10 kg de linge sec, dont la vitesse périphérique du tambour ne dépasse pas 50 m/s et dont la **tension assignée** n'est pas supérieure à 250 V pour les appareils monophasés et à 480 V pour les autres appareils, y compris les appareils alimentés en courant continu et les **appareils alimentés par batteries**.

Les appareils non destinés à un usage domestique normal, mais qui peuvent néanmoins constituer une source de danger pour le public, tels que les essoreuses centrifuges destinées à être utilisées par des usagers non avertis dans des magasins, chez des artisans et dans des fermes, ainsi que les essoreuses centrifuges destinées à un usage collectif dans des immeubles d'habitation ou dans des laveries automatiques, relèvent du domaine d'application de la présente norme.

Dans la mesure du possible, la présente norme traite des dangers raisonnablement prévisibles que présentent les appareils pour toutes les personnes. Cependant, elle ne tient pas compte en général:

– des personnes (y compris des enfants) dont
  - les capacités physiques, sensorielles ou mentales; ou
  - le manque d'expérience et de connaissance

  les empêchent d'utiliser l'appareil en toute sécurité sans surveillance ou instruction;

– des enfants qui jouent avec l'appareil.

L'attention est attirée sur le fait que:

– pour les appareils destinés à être utilisés dans des véhicules ou à bord de navires ou d'avions, des exigences supplémentaires peuvent être nécessaires;

– dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux de la santé, par les organismes nationaux responsables de la protection des travailleurs, par les organismes nationaux responsables de l'alimentation en eau et par des organismes similaires.

La présente norme ne s'applique pas:

– aux appareils prévus exclusivement pour des usages industriels;

– aux appareils destinés à être utilisés dans des locaux qui présentent des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz).

2 Références normatives

L'article de la Partie 1 s'applique, avec l'exception suivante.

Addition:

IEC 60584-1, *Couples thermoélectriques – Partie 1: Spécifications et tolérances en matière de FEM*

IEC 60730-2-12:2015, *Dispositifs de commande électrique automatiques – Partie 2-12: Exigences particulières pour les serrures électriques de portes*

3 Termes et définitions

L'article de la Partie 1 s'applique, avec l'exception suivante.

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 *Modification:*

Remplacer le premier alinéa par ce qui suit:

fonctionnement de l'appareil dans les conditions suivantes:

le tambour est chargé de linge dont la masse à sec est égale à la masse maximale spécifiée dans les instructions. Le linge est constitué de pièces de coton décati à double ourlet, de dimensions approximatives 700 mm × 700 mm et de masse spécifique comprise entre 140 g/m^2 et 175 g/m^2 à sec. Il est saturé d'eau avant d'être uniformément réparti dans le tambour

4 Exigences générales

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

5.2 *Addition:*

Les essais du 21.101, du 21.102 et du 22.101 doivent être effectués sur le même appareil que celui utilisé pour l'essai de l'Article 18.

5.3 *Addition:*

Les essais du 21.101 et du 21.102 sont effectués avant l'essai de l'Article 18. L'essai du 22.101 est effectué après l'essai de l'Article 18.

6 Classification

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

6.1 *Modification*:

Remplacer le premier alinéa par ce qui suit:

Les appareils doivent être de la **classe I**, de la **classe II** ou de la **classe III**.

6.2 *Addition:*

Les appareils doivent être classés au moins IPX4.

7 Marquage et instructions

L'article de la Partie 1 s'applique, avec les exceptions suivantes.

7.10 *Addition*:

Si la **position arrêt** est indiquée uniquement par des lettres, le mot "arrêt" doit être utilisé.

7.12 *Addition*:

Les instructions doivent spécifier la masse maximale de linge sec, en kilogrammes, à utiliser dans l'appareil.

7.12.1 *Addition*:

Si l'étiquette spécifiée en 7.101 est fournie avec l'appareil, les instructions d'installation doivent indiquer qu'elle doit être fixée de façon permanente sur le mur près de l'appareil.

Pour les appareils destinés à un usage collectif dans des immeubles d'habitation, et qui comportent un système de verrouillage qui doit être alimenté pour déverrouiller le couvercle, les instructions d'installation doivent indiquer qu'un dispositif qui met automatiquement l'appareil hors tension ne doit pas être installé dans le circuit d'alimentation.

7.101 Les appareils destinés à un usage collectif dans des immeubles d'habitation, et qui comportent un système de verrouillage qui doit être alimenté pour déverrouiller le couvercle, doivent être fournis avec une étiquette qui comporte en substance l'indication suivante, à moins que cette indication ne soit marquée sur l'appareil:

> Cette essoreuse doit être raccordée au réseau d'alimentation avant que le couvercle puisse être ouvert. Ne pas forcer pour ouvrir.