IEC 60335-2-37

Edition 6.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Household and similar electrical appliances – Safety – Part 2-37: Particular requirements for commercial electric doughnut fryers and deep fat fryers

Appareils électrodomestiques et analogues – Sécurité – Partie 2-37: Exigences particulières pour les friteuses et les friteuses à beignets électriques à usage collectif

IEC 60335-2-37:2017-03(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-37: Particular requirements for commercial electric doughnut fryers and deep fat fryers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

This bilingual version (2019-02) corresponds to the monolingual English version, published in 2017-03.

This sixth edition cancels and replaces the fifth edition published in 2002 including its Amendment 1 (2008) and its Amendment 2 (2011). It constitutes a technical revision.

The principle changes in this edition as compared with the fifth edition of IEC 60335-2-37 are as follows (minor changes are not listed):

- stating some wording in the scope more precisely;
- addition of a measurement method for pans in the definition for **normal operation**;
- new definitions on the topic surface temperature;

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- deletion of the paragraph with the warning for dangerous voltages (already covered by Part 1);
- addition of hot surface symbol IEC 60417-5041;
- addition of instructions and markings on hot surfaces and other topics;
- addition of requirements, measuring methods and thresholds for different materials on hot surfaces;
- modification on leakage current defining the value for appliances with a power consumption less than 1 kW;
- modification on the criteria for the stability test;
- addition of a requirement for the construction of **stationary appliances** with rollers or castors;
- modification on some points concerning permanent connection to fixed wiring;
- addition of specific requirements concerning types of screws to be used for electrical connections and connections for earth continuity;
- addition of a figure showing the surfaces to be measured;
- addition of a figure showing the probe for measuring surface temperatures;
- addition of informative Annex P dealing with leakage currents for appliances used in tropical climates.

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

FDIS	Report on voting
61/5328/FDIS	61/5384/RVD

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

The French version of this standard has not been voted upon.

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

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. 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 commercial electric doughnut fryers and deep fat fryers.

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

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- 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 of Part 1 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 "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

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

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

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INTRODUCTION

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

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

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

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

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

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

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

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

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-37: Particular requirements for commercial electric doughnut fryers and deep fat fryers

1 Scope

This clause of Part 1 is replaced by the following.

This international Standard deals with the safety of electrically operated commercial **deep fat fryers** and **doughnut fryers** including pressurized types with a pressure not exceeding 50 kPa and a pressure volume litres product of 200. These appliances are not intended for household and similar use, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances.

NOTE 101 These appliances are used for the commercial processing of food, for example in kitchens of restaurants, canteens, hospitals and in commercial enterprises such as bakeries, butcheries, etc.

The electrical part of appliances making use of other forms of energy is also within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by these types of appliances.

NOTE 102 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may 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;
- in many countries, additional requirements are specified for pressure appliances.

NOTE 103 This standard does not apply to

- appliances designed 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);
- appliances for continuous mass production of food.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs with specified property classes – Coarse thread and fine pitch thread*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs*

ISO 3506-2, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 2: Nuts*

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ISO 3506-3, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 3: Set screws and similar fasteners not under tensile stress*

ISO 3506-4, *Mechanical properties of corrosion-resistant stainless steel fasteners – Part 4: Tapping screws*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.4 *Addition:*

Note 1 to entry: The **rated power input** is the sum of the power inputs of all the individual elements in the appliance that can be on at one time; where there are several such combinations possible, that giving the highest power input is used in determining the **rated power input**.

3.1.9 *Replacement:*
normal operation
operation of the appliance under the following conditions:

The appliance is filled with oil or fat according to the manufacturer's instructions up to the minimum **indicated level**.

The thermal control is set at the maximum setting. Lids, if provided, are left in the open position or removed unless the manufacturer's instructions indicate that the appliance is designed for operation with the lid closed.

Motors incorporated in the appliance are operated in the intended manner under the most severe conditions that can be expected in normal use taking into account the manufacturer's instructions.

3.101
deep fat fryer
appliance provided with one or more containers in which the food to be cooked is immersed in the frying medium

Note 1 to entry: The container(s) may be fixed, removable, lifting, tilting, etc.

Note 2 to entry: The pressure within the container can exceed atmospheric pressure.

3.102
indicated level
mark on the appliance to indicate either the minimum or the maximum liquid level for correct operation

3.103
installation wall
special fixed construction containing supply facilities for appliances installed in conjunction with it

3.104
rated pressure
the maximum working pressure assigned by the manufacturer to the pressurized part of the appliance

3.105
doughnut fryer
appliance with large surface area and flat container in which the bakery products e. g. donuts are prepared in fat or oil by floating

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The **doughnut fryer** is generally not equipped with a cold area. The appliance can be delivered with a removable bakery product basket, a lifting or turning device.

3.106
functional surface
surface that is intentionally heated by an internal heat source and has to be hot to carry out the function for which the appliance is intended

Note 1 to entry: An example is the heated sheath of a tubular heating element

3.107
adjacent surface
surface adjacent to a **functional surface** and which can become hot through conduction

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.

5.5 *Addition:*

The tests are carried out with the container in the position of normal use for frying.

5.10 *Addition:*

Appliances intended for installation in a bank of other appliances and appliances intended to be fixed to an ***installation wall*** *are enclosed to obtain protection against electric shock and harmful ingress of water equivalent to that obtained when installed in accordance with the instructions provided with the appliance.*

NOTE 101 Appropriate enclosures or additional appliances may be needed for test purposes.

5.101 Appliances are tested as **heating appliances**, even if they incorporate a motor.

5.102 *Appliances, when assembled in combination with or incorporating other appliances, are tested in accordance with the requirements of this standard. The other appliances are operated simultaneously in accordance with the requirements of the relevant standards.*

5.103 *Appliances are initially filled with unused vegetable oil. The series of relevant tests are carried out with this oil, unused oil being added as necessary to maintain a constant level.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

Appliances shall be **class I** with respect to protection against electric shock.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

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Appliances normally used on a table shall be at least IPX3. Other appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

The appliances shall be marked with the **rated pressure**, in kilopascals (kPa), on pressurized parts of the appliance.

If appliances have external **accessible surfaces** or lids, for which temperature rise limits are specified in Table 101 and for which the provisions of footnote b to Table 101 apply, then the appliance shall be marked with symbol IEC 60417-5041(2002-10), or with the substance of the following:

CAUTION: Hot surfaces.

7.6 *Addition:*

[symbol IEC 60417-5041 (2002-10)] caution, hot surface

7.10 *Addition:*

Devices controlling the tilting process of appliances with tilting parts shall be clearly marked to show the direction of movement.

7.12 *Addition:*

The instructions shall include a warning that danger of fire exists if the fat or oil level is below the minimum **indicated level**. To avoid a fire hazard, the instruction for appliances which are intended to be used with solid fat shall include information how to melt the fat.

The instructions shall include the kind of frying medium (fat or oil) and the maximum batch load in kilograms.

The instructions shall include the substance of the following:

These appliances are intended to be used for commercial applications, for example in kitchens of restaurants, canteens, hospitals and in commercial enterprises such as bakeries, butcheries, etc., but not for continuous mass production of food.

If the manufacturer wants to limit the use of the appliance to less than the above, this has to be clearly stated in the instructions.

The instructions shall include a warning regarding the danger of using old fat or oil, emphasizing that this will have a reduced flash-point and be more prone to surge boiling.

The instructions shall also include the substance of the following warnings:

WARNING: Do not open drain cocks or other emptying devices until the pressure has been reduced to approximately atmospheric pressure.

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WARNING: Opening the drain cock will lead to the outflow of the hot contents of the deep fat fryer.

Attention shall also be drawn to the effect on surge boiling of over-wet food and too large a charge.

If symbol IEC 60417-5021 (2002-10) or symbol IEC 60417-5041 (2002-10) is marked on the appliance, its meaning shall be explained.

Modification:

The instruction concerning persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge is not applicable.

7.12.1 *Addition:*

The appliance shall be accompanied by instructions detailing any special precautions necessary for installation. For appliances intended for installation in a bank of other appliances and appliances intended to be fixed to an **installation wall**, details of how to ensure appropriate protection against electric shock and harmful ingress of water shall be supplied. If the controls of more than one appliance are combined in a separate enclosure, detailed installation instructions shall be supplied. Instructions for **user maintenance**, for example cleaning, shall also be given. They shall include a statement that the appliance is not to be cleaned with a water jet or a steam cleaner.

Appliances that are provided with an appliance inlet, and are intended to be immersed in water for cleaning shall be accompanied by an instruction stating that the connector shall be removed before the appliance is cleaned and that the appliance inlet shall be dried before the appliance is used again.

The instructions of appliances other than **stationary appliances** and appliances with **detachable electrical parts**, that are not intended to be partially or completely immersed in water for cleaning, shall state that the appliance or part must not be immersed.

For appliances that are permanently connected to fixed wiring and for which leakage currents may exceed 10 mA, particularly if disconnected or not used for long periods, or during initial installation, the instructions shall give recommendations regarding the rating of **protective devices**, such as earth leakage relays, to be installed.

The installation instruction shall include a statement that the appliance has to be installed and used in such a way that any water cannot contact the fat or oil.

If a **stationary appliance** is intended to be moved for cleaning, this shall be stated.

For **stationary appliances** equipped with rollers or castors or intended to be moved for cleaning, the instructions shall state the substance of the following.

> This appliance is to be connected with flexible connections for equipotential bonding and connection to services such as electricity supply, water supply, gas supply and steam supply such that the appliance can be moved in the direction required for cleaning a distance not less than the dimension of the appliance in the direction of movement plus 500 mm without the flexible connections becoming taut or being subject to strain

7.12.4 *Addition:*

The instructions for **built-in appliances** having a separate control panel for several appliances shall state that the control panel is only to be connected to the specified appliances in order to avoid a possible hazard.

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7.12.9 *Not applicable.*

7.14 *Addition:*

The height of the triangle in symbol IEC 60417-5041 (2002-10) shall be at least 15 mm.

7.15 *Addition:*

The marking specified for external **accessible surfaces** shall be visible when the appliance is operated as in normal use, including when actuating any switch, adjusting any control or opening a lid or door. It shall not be placed on a **functional surface** or **adjacent surface**.

Modification:

For **fixed appliances**, the marking of the name or trademark or identification mark of the manufacturer or responsible vendor and the model or type reference shall be marked on the appliance and, if not visible when the appliance is installed as in normal use, shall be included in the instructions or on an additional label that can be fixed near the appliance after installation.

NOTE 101 An example of such an appliance is a **built-in hob.**

7.101 Equipotential bonding terminals shall be marked with symbol IEC 60417-5021 (2002-10).

These indications shall not be placed on screws, removable washers or other parts that can be removed when conductors are being connected.

Compliance is checked by inspection.

7.102 Appliances or the **detachable electrical parts** of appliances intended to be partially immersed in water for cleaning shall be marked with a line that clearly indicates the maximum depth of immersion, together with the substance of the following warning:

Do not immerse beyond this line.

If there is any seam or seal that causes the appliance or part not to withstand the treatment specified in 15.102, the line indicating the maximum depth of immersion shall be at least 50 mm below any such seam or seal when the appliance or the part is in the position in which it is to be cleaned.

Compliance is checked by inspection and measurement.

7.103 Appliances shall be marked with the minimum and maximum fat or oil levels.

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is applicable except as follows.

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9.101 Fan motors providing a cooling effect in order to comply with the requirements of Clause 11 shall start under all voltage conditions that may occur in use.

Compliance is checked by the following tests using a supply source such that its drop in voltage does not exceed 1 % during the tests. The appliance being returned to the ambient temperature specified in 5.7 after each test.

The appliance is started under the conditions occurring at the beginning of ***normal operation*** *or, for automatic appliances, at the beginning of the normal cycle of operation,–a voltage equal to 0,85 times* ***rated voltage*** *being applied to the input terminals of the appliance.*

For appliances provided with motors having other than centrifugal starting switches, this test is repeated at a voltage equal to 1,06 times ***rated voltage*** *being applied to the input terminals of the appliance.*

The tests are carried out three times.

In all cases, the motor shall start and it shall function in such a way that safety is not affected and overload ***protection devices*** *of the motor shall not operate.*

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Addition:*

For appliances having more than one heating unit, the total power input may be determined by measuring the power input of each heating unit separately (see also 3.1.4).

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Addition:*

Appliances intended to be fixed to the floor and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means are installed in accordance with the manufacturer's instructions. If no instructions are given, these appliances are considered as appliances normally placed on the floor.

11.2 *Addition:*

The temperature of the fat or oil is measured 25 mm below the surface in the center of the container but not closer than 10 mm to the heating element.

Where the external ***accessible surfaces*** *are suitably flat and access permits, then the test probe of Figure 102 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.

11.4 *Replacement:*

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*Appliances are operated under **normal operation** such that the total power input of the appliance is 1,15 times **rated power input**. If it is not possible to switch on all heating elements at the same time, the test is made with each of the combinations that the switch arrangement will allow, the highest load possible with each switching arrangement being in circuit.*

If the appliance is provided with a control that limits the total power input, the test is made with whichever combination of heating units, as may be selected by the control, imposes the most severe condition.

*If the temperature rise limits of motors, transformers or **electronic circuits** are exceeded, the test is repeated with the appliance supplied at 1,06 times **rated voltage**. In this case only the temperature rises of motors, transformers or **electronic circuits** are measured.*

11.7 *Replacement:*

Appliances are operated until steady conditions are established.

*Steady conditions are considered to exist 60 min after reaching the temperatures defined for **normal operation**.*

When an appliance is assembled in combination with, equipped with or incorporating accessories or other appliances the interaction shall be covered if they are provided to operate simultaneously as stated by the manufacturer or by a common control.

Tilting motors are operated immediately after the appliance has reached steady conditions, for one full cycle of operation (one cycle being from the fully up position to the fully down position and back to the fully up position).

Lifting motors are similarly operated, but for three such cycles.

11.8 *Addition:*

The temperature of the oil or fat is measured at least 10 mm from the wall of the container and 10 mm above the bottom. However, the temperature is measured 10 mm above the highest point of heating elements if they are located in the container.

The maximum temperature of the fat or oil shall not exceed 200 °C.

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

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

Surface[a]	*Temperature rise of external accessible surfaces*[b] *K*
Bare metal	*48*
Coated metal [c]	*59*
Glass and ceramic	*65*
Plastic and plastic coating > 0,4 mm [d, e]	*74*

[a] *Temperature rises are not measured on:*
- *the underside of appliances intended to be used on a working surface or floor;*
- *the rear surface of appliances;*
- *surfaces that are inaccessible to a 75 mm diameter probe having a hemispherical end*
- *functional surfaces and adjacent surfaces.*

[b] *The temperature rise on external accessible surfaces up to a distance of 100 mm from adjacent surfaces of the appliance, (see Figure 101) may exceed the limits by up to 25 K, but the relevant part shall then be marked with symbol IEC 60417-5041 (2002-10) or the equivalent text. The temperature rise on lids may exceed the limits, but the relevant part shall then be marked with symbol IEC 60417-5041 (2002-10) or the equivalent text.*

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

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

[e] *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*

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

Instead of the permissible leakage current for ***stationary class I appliances****, the following applies:*

- *for cord and plug connected appliances* — *0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with a maximum of 10 mA, whichever is higher.*
- *for other appliances* — *0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with no maximum, whichever is higher.*

For ***portable class I appliances****, instead of the permissible leakage current, the following applies:*

- *for cord and plug connected appliances* — *0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with a maximum of 10 mA, whichever is higher.*

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14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1 *Addition:*

Any ***detachable electrical parts*** *or appliances, other than* ***stationary appliances****, not marked with a line indicating the maximum depth of immersion for cleaning, or for which there is no warning against partial or complete immersion in water for cleaning in the instructions,* are also subjected to the tests of 15.102.

15.1.1 *Addition:*

In addition, IPX0, IPX1, IPX2, IPX3 and IPX4 appliances are subjected for 5 min to the following splash test.

The apparatus shown in Figure 103 is used. During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl. The bowl is placed on the floor for appliances normally used on the floor. For all other appliances on a horizontal support 50 mm below the lowest edge of the appliance, the bowl is so moved around as to splash the appliance from all directions. Care is taken that the appliance is not hit by the direct jet.

15.1.2 *Modification:*

Appliances normally used on a table are placed on a support having dimensions that are 15 cm ± 5 cm in excess of those of the orthogonal projection of the appliance on the support.

15.101 Appliances that are provided with a tap intended for filling or cleaning, shall be constructed so that the water from the tap cannot come into contact with **live parts**.

Compliance is checked by the following test.

The tap is fully opened for 1 min with the appliance connected to a water supply having the maximum water pressure indicated by the manufacturer. Tiltable and movable parts, including lids, are tilted or placed in the most unfavourable positions. Swivelling outlets of water taps are so positioned as to direct water on to those parts that will give the most unfavourable result. Immediately following this treatment the appliance shall withstand an electric strength test as specified in 16.3.

15.102 Appliances or **detachable electrical parts** intended to be partially or completely immersed in water for cleaning shall have adequate protection against the effects of immersion.

Compliance is checked by the following tests.

The sample is operated under ***normal operation****, the supply voltage being such that the power input of the appliance is 1,15 times the* ***rated power input*** *until steady conditions are established.*

The connector is then withdrawn or the supply otherwise switched off and the sample is immediately emptied and then immersed completely in water having a temperature between

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10 °C and 25 °C, unless it is marked with a line indicating the maximum depth of immersion, in which case it is immersed to the depth indicated.

After 1 h of immersion, the sample is removed from the water and dried, care being taken to ensure that all moisture is removed from the insulation in the vicinity of the pins of appliance inlets. The leakage current is then measured on the assembled appliance, as described in 16.2.

The leakage current shall not exceed the value specified in 16.2.

After the treatment described above and the measurement of the leakage current, the sample shall withstand an electric strength test as specified in 16.3, the test voltage being, however, reduced to 1 000 V.

The sample is then operated as above for 10 days (240 h). During this period, the sample is allowed to cool to approximately room temperature five times at regular intervals.

After this period, the connector of the sample is withdrawn or the supply otherwise switched off and the sample immediately emptied and immersed once more in water for 1 h as described above. It is then dried and the leakage current is measured again as described in 16.2.

The leakage current shall not exceed the value specified in 16.2.

The sample shall then withstand an electric strength test as specified before, and inspection shall show that there is no trace of water on insulation which could result in a reduction of **clearances** or **creepage distances** below the values specified in Clause 29.

NOTE Care has to be taken when dismantling to avoid displacing any water within the appliance.

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Modification:*

Instead of the permissible leakage current for ***stationary class I appliances****, the following applies:*

– *for cord and plug connected appliances*	*0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with a maximum of 10 mA, whichever is higher.*
– *for other appliances*	*0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with no maximum, whichever is higher.*

For ***portable class I appliances****, instead of the permissible leakage current, the following applies:*

– *for cord and plug connected appliances*	*0,75 mA or 1 mA per kW* ***rated power input*** *of the appliance with a maximum of 10 mA, whichever is higher.*

Addition:

For appliances intended to be used with a connector and intended to be partially or completely immersed in water for cleaning, the appliance inlet may be dried, for example by

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