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**Household and similar electrical appliances – Safety –
Part 2-50: Particular requirements for commercial electric bains-marie**

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CONSOLIDATED VERSION



**Household and similar electrical appliances – Safety –
Part 2-50: Particular requirements for commercial electric bains-marie**

INTERNATIONAL
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REDLINE VERSION



**Household and similar electrical appliances – Safety –
Part 2-50: Particular requirements for commercial electric bains-marie**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-50: Particular requirements
for commercial electric bains-marie**

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 Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 60335-2-50 bears the edition number 4.2. It consists of the fourth edition (2002-11) [documents 61E/405/FDIS and 61E/417/RVD], its amendment 1 (2007-12) [documents 61E/588/FDIS and 61E/593/RVD] and its amendment 2 (2017-06) [documents 61/5364/FDIS and 61/5392/RVD]. The technical content is identical to the base edition and its amendments.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

This part of International Standard IEC 60335 has been prepared by IEC subcommittee 61E: Safety of electrical commercial catering equipment, of IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition constitutes a technical revision.

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 fourth edition (2001) 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 bains-marie.

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 of Part 1 concerns an adjective, the adjective and the associated noun are also in bold.

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

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

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

The following differences exist in the countries indicated below.

- 6.1: Class 01 appliances are allowed (Japan).
- 6.2: For appliances intended to be installed in a kitchen, an appropriate degree of protection against harmful ingress of water is required according to their height of installation (France).
- 13.2: Leakage current limits are different (Japan).
- 16.2: Leakage current limits are different (Japan).
- Clause 21: For appliances intended to be installed in a kitchen, different values of impact energy are applicable according to the height of the impact point (France).

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

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

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

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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.

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.

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-50: Particular requirements for commercial electric bains-marie

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electrically operated commercial **bains-marie** 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 similar 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;
- for appliances intended to be used outdoors, additional requirements may be necessary.

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 process appliances for the 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*

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 101 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

Open-well and **wet-heat-type bains-marie** are filled with water to the **indicated level** and topped up during the test in accordance with the manufacturer's instructions. The appliance is operated with any control intended to be operated by the user set at maximum. If the water boils, the control is then adjusted to the lowest setting that maintains simmering. No covers or containers are fitted.

Dry-heat-type bains-marie are operated with any controls set at the maximum. Empty food containers are placed in the well but with the container covers removed.

Combined-type appliances are operated under the most unfavourable conditions.

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

bain-marie

an appliance with a well that is used for the storage of hot food in containers prior to serving. The containers are indirectly heated by hot air, steam or water in the well

3.102

open-well-type bain-marie

an appliance where the food containers rest in water in a heated well

3.103

wet-heat-type bain-marie

an appliance where the fitted food containers are heated by steam generated within the appliance. The pressure in the well or steam generator does not differ significantly from atmospheric pressure

3.104

dry-heat-type bain-marie

an appliance where the fitted food containers are heated by warm air generated within the appliance

3.105**indicated level**

a mark on the appliance to indicate the maximum liquid level for correct operation

3.106**installation wall**

a special fixed construction containing supply facilities for appliances installed in conjunction with it

3.107**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.

3.108**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.

5.10 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.*

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:

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:

~~In addition, appliances shall be marked with the water pressure or range of pressures, in kilopascals (kPa), for appliances intended to be connected to a water supply, unless this is indicated in the instruction sheet.~~

If appliances have external **accessible surfaces**, 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 5021 of IEC 60417-1]~~ equipotentiality



[symbol IEC 60417-5041 (2002-10)]

Caution, hot surface

7.12 Addition:

If symbols ~~5021~~ of IEC 60417-1-5021 (2002-10) and IEC 60417-5041 (2002-10) ~~is~~ are marked on the appliance its meaning shall be explained.

The instructions shall include the substance of the following warning:

WARNING: Opening the drain cock will lead to the outflow of the hot contents of the bains-marie.

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.

Modification:

The instructions concerning persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge and children playing with the appliance are not applicable.

7.12.1 Replacement:

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 partially or completely 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.

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.

Compliance is checked by inspection.

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.

7.12.9 Not applicable.

7.14 Addition:

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

7.15 Addition:

~~When it is not practical to place the marking of **fixed appliances** so that it is visible after the appliance has been installed, the relevant information shall also be included in the instructions for use or on an additional label that can be fixed near the appliance after installation.~~

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 a **fixed appliance** is a **built-in appliance**.

7.101 Equipotential bonding terminals shall be marked with symbol 5021 of IEC 60417-1.

These markings 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 intended to be filled by hand or a manually operated tap shall be marked with an **indicated level**.

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.

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 starting the motor three times at a voltage equal to 0,85 times **rated voltage**, the motor being at room temperature at the beginning of the test.*

*The motor is started each time under the conditions occurring at the beginning of **normal operation** or, for automatic appliances, at the beginning of the normal cycle of operation, the motor being allowed to come to rest between successive starts. 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**.*

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

NOTE The supply source is such that during the test the drop in voltage does not exceed 1 %.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Addition:

NOTE 101 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.

11.3 Addition:

*Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 103 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ 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:

*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 Replace the test specification paragraph by the following.

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.

NOTE 101 The duration of the test may consist of more than one cycle of operation.

11.8 Addition:

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 ^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: <ul style="list-style-type: none"> – 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 102) 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.	
^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.

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:

Appliances or any detachable electrical parts intended to be partially or completely immersed in water for cleaning are also subjected to the tests of 15.102.

NOTE 101 Appliances other than stationary or any detachable electrical parts not marked with a line indicating the maximum depth of immersion, or for which there is no warning against partial or complete immersion in the instruction sheet, are considered to be appliances intended to be completely immersed in water for cleaning.

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 101 is used. During the test, the water pressure is regulated so 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 moved around in such a way 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.

15.2 Replacement:

Appliances shall be constructed so that spillage of liquid in normal use does not affect their electrical insulation.

Compliance is checked by the following test using a spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent.

Any commercially available non-ionic rinsing agent may be used, but if there is any doubt with regards to the test results, the rinsing agent shall have the following properties:

- viscosity, 17 mPa·s;

– pH, 2,2 (1 % in water)

and its composition shall be

Substance	Parts by mass %
Plurafac ® LF 221 ¹	15,0
Cumene sulfonate (40 % solution)	11,5
Citric acid (anhydrous)	3,0
Deionized water	70,5

Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in 26.6, and other appliances are tested as delivered.

Appliances provided with an appliance inlet are tested with or without an appropriate connector in position, whichever is the more unfavourable.

Detachable parts are removed.

The water-well and steam generators of appliances intended to be filled by hand are completely filled with ~~water containing approximately 1 % NaCl~~ the solution and a further quantity equal to 15 % of their capacity but not more than 10 l is poured in steadily over a period of 1 min.

The food containers of **dry-heat-type bains-marie** are filled with ~~water~~ the solution and placed in the appliance. A further quantity of 1 l is then added to each container.

Appliances intended to be filled by a manually operated tap or automatically are connected to a water supply having the maximum supply pressure indicated by the manufacturer. The means for controlling the incoming water is held fully open and the filling continued for 1 min after the first evidence of overflow, or until a further protective system operates to stop the inflow.

The appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of water on the insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.

~~15.3 Addition:~~

~~NOTE 101. If it is not possible to place the whole appliance in the humidity cabinet, parts containing electrical components are tested separately, taking into account the conditions that occur in the appliance.~~

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.

¹ Plurafac ® LF 221 is the trade name of a product supplied by BASF. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

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, if relevant, immediately emptied and then immersed completely in water having a temperature between 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 down 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 water has not entered the appliance to any appreciable extent.

NOTE When inspecting the appliance for the presence of water, special attention is paid to parts of the appliance in which electrical components are situated.

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:*

- | | |
|--|---|
| <ul style="list-style-type: none"> – for cord and plug connected appliances | <p><i>0,75 mA or 1 mA per kW rated power input of the appliance with a maximum of 10 mA, whichever is higher.</i></p> |
| <ul style="list-style-type: none"> – for other appliances | <p><i>0,75 mA or 1 mA per kW rated power input of the appliance with no maximum, whichever is higher.</i></p> |

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:

NOTE 101 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 means of blotting paper, before applying the test voltage if the appliance would not otherwise withstand this test.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 Addition:

A control or switching device that is intended for different settings corresponding to different functions of the same part of the appliance and that are covered by different standards is, in addition, set in the most severe setting, irrespective of the manufacturer's instructions.

19.2 Addition:

Appliances are tested without water and those intended to be automatically filled are tested with the water supply turned off.

~~19.4 Addition:~~

~~NOTE 101 The main contacts of the contactor intended for switching on and off the heating element(s) in normal use are locked in the "ON" position. However, if two contactors operate independently of each other or if one contactor operates two independent sets of main contacts, these contacts are locked in the "ON" position in turn.~~

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 Addition:

Movable parts, including lids, are placed in the most unfavourable position.

NOTE 101 Any spillage of liquid is ignored.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.15 Addition:

Appliances intended to transport food or other loads shall be provided with a suitable means to protect the **supply cord** from damage during transportation.

22.101 For 3-phase appliances, thermal cut-out protecting circuits with heating elements, and those for motors of which the unexpected starting may cause a hazard, shall be of the non-self-resetting, trip-free type and shall provide **all-pole disconnection** from ~~the related~~ supply circuits.

For single-phase appliances and for single-phase heating elements and/or motors connected between one phase and neutral or between phase and phase, thermal cut-out protecting circuits with heating elements, and those for motors of which the unexpected starting may cause a hazard, shall be of the non-self-resetting trip-free type and shall provide at least one-pole disconnection.

If the **non-self-resetting thermal cut-out** is only accessible after removing parts with the aid of a **tool**, the trip-free type is not required.

NOTE 1 **Thermal cut-outs** of the trip-free type have an automatic action, with a reset actuating member, so constructed that the automatic action is independent of manipulation or position of the reset mechanism.

Thermal cut-outs of the bulb and capillary type that operate during the tests of Clause 19 shall be such that rupture of the capillary tube shall not impair compliance with the requirements of 19.13.

Compliance is checked by inspection and by manual test, and by rupturing the capillary tube.

NOTE 2 Care must be taken to ensure that the rupture does not seal the capillary tube.

22.102 Lights, switches or push-buttons shall only be coloured red for the indication of danger, alarm or similar situations.

Compliance is checked by inspection.

22.103 Appliances fitted with wheels or similar means shall be provided with an efficient means of locking while the appliance is stationary.

Compliance is checked by inspection and by the following test.

The appliance is fully loaded in accordance with the manufacturer's instructions. If no instructions are provided, the containers delivered with the appliance are completely filled with water. If no containers are supplied, suitable containers are used for the test.

~~*The appliance is then placed on a plane inclined at 10° to the horizontal, with the locking mechanism applied. The appliance, fully loaded in accordance with the manufacturer's instructions, is placed on a rigid plane coated with aluminium oxide paper (grain size 80) and inclined at 10° to the horizontal, with the locking mechanism applied. The appliance shall not move by more than 100 mm.*~~

22.104 Drain cocks and other emptying devices for hot liquids shall be constructed so that they cannot be opened inadvertently. Moreover, it shall not be possible to withdraw drain plugs inadvertently.

Compliance is checked by inspection and by manual test.

NOTE For example, this requirement is met when the valve handle is such that, when released, it returns automatically to the closed position, or is of the wheel type or placed in a recess.

22.105 Means provided to allow drainage of water from **bain-marie** wells or steam generators shall discharge the water in such a manner that electrical insulation is not affected.

Compliance is checked by inspection and by manual test.

22.106 The level to which manually filled appliances have to be filled shall be so located as to be readily visible when filling.

Compliance is checked by inspection.

22.107 Portable appliances shall not have openings on the underside that would allow small items to penetrate and touch **live parts**.

*Compliance is checked by inspection and by measuring the distance between the supporting surface and **live parts** through openings. This distance shall be at least 6 mm. However, if the appliance is fitted with legs, this distance is increased to 10 mm if the appliance is intended to stand on the table and to 20 mm if it is intended to stand on the floor.*

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 Addition:

*When the capillary tube of the **thermostat** is liable to flexing in normal use the following applies:*

- *where the capillary tube is fitted as part of the internal wiring, Part 1 applies;*
- *where the capillary tube is separate, it shall be subjected to 1 000 flexings at a rate not exceeding 30 per minute.*

NOTE 101 If, in any of the above cases, it is not possible to move the movable part of the appliance at the given rate, due for example to the mass of the part, the rate of flexing may be reduced.

After the test, the capillary tube shall show no sign of damage within the meaning of this standard and no damage impairing its further use.

However, if a rupture of the capillary tube renders the appliance inoperative (fail-safe), separate capillary tubes are not tested, and those fitted as part of the internal wiring are not inspected for compliance with the requirements.

Compliance in this instance is checked by rupturing the capillary tube.

NOTE 102 Care must be taken to ensure that the rupture does not seal the capillary tube.

24 Components

This clause of Part 1 is applicable except as follows.

24.101 Connectors fitted to appliances shall not incorporate a **thermostat**.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.3 Addition:

~~Fixed appliances and~~ Appliances with a mass greater than 40 kg, intended for permanent connection to fixed wiring and not provided with rollers, castors or similar means shall be constructed so that the ~~supply cord connection can be connected~~ done after the appliance has been installed in accordance with the manufacturer's instructions.

Terminals for permanent connection of cables to fixed wiring may also be suitable for the **type X attachment** of a **supply cord**. In this case a cord anchorage complying with 25.16 shall be fitted to the appliance.

If the appliance is provided with a set of terminals allowing the connection of a flexible cord, they shall be suitable for the **type X attachment** of the cord.

In both cases the instructions shall give full particulars of the power **supply cord**.

The connection to the supply wires of **built-in appliances** may be made before the appliance is installed.

Compliance is checked by inspection.

25.7 Modification:

*Instead of the types of **supply cords** specified, the following applies.*

Supply cords shall be oil-resistant, sheathed flexible cable not lighter than ordinary polychloroprene or other equivalent synthetic elastomer-sheathed cord (code designation 60245 IEC 57).

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable except as follows.

27.2 Addition:

Stationary appliances shall be provided with a terminal for the connection of an external equipotential conductor. This terminal shall be in effective electrical contact with all fixed exposed metal parts of the appliance, and shall allow the connection of a conductor having a nominal cross-sectional area of up to 10 mm². It shall be located in a position convenient for the connection of the bonding conductor after installation of the appliance.

NOTE 101 Small fixed exposed metal parts, for example nameplates and the like, are not required to be in electrical contact with the terminal.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.1 Addition:

Screws made of carbon steel and alloy steel shall be made in accordance with ISO 898-1.

Screws made of corrosion-resistant stainless-steel shall be made in accordance with ISO 3506-1, or ISO 3506-2, or ISO 3506-3, or ISO 3506-4.

28.4 Addition:

Screws that make mechanical connections and electrical connections shall be so designed that the contact pressure does not change appreciably through loosening of the screwed assembly parts during operational stress and contact corrosion.

Screws that make mechanical connections and provide earthing continuity shall be so designed that the contact pressure does not change appreciably through loosening of the screwed assembly parts due to operational stress and contact corrosion. They shall be designed so that a minimum contact pressure remains.

Compliance is checked by inspection and by measuring the assembling torques for screwed connections providing earthing continuity by applying a torque as specified in Table 102 to turn the screw in the fastening direction. The screw shall not turn.

The screw shall not have been unfastened prior to performing this test.

Table 102 – Assembling torques for screwed connections providing earthing continuity

Outer thread diameter of the screw mm	Assembling torque Nm	
	Screwed connections for the mechanical strength of the screws A2-70 according to ISO 3506-1, or ISO 3506-2, or ISO 3506-3, or ISO 3506-4 and 5.8 according to ISO 898-1	Screwed connections for the mechanical strength of the screws > 8.8 according to ISO 898-1
> 2,8 and ≤ 3,6	0,8	1,3
> 3,6 and ≤ 4,2	1,9	3,0
> 4,2 and ≤ 5,3	3,7	6,0
> 5,3 and ≤ 6,3	6,5	10,0
M 8	15,0	25,0
M 10	31,0	50,0

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 Addition:

The microenvironment is pollution degree 3 and the insulation shall have a comparative tracking index (CTI) not less than 250, unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.1 Modification:

The glow-wire test is carried out at 650 °C. The glow-wire flammability index (GWFI) according to IEC 60695-2-12 shall be at least 650 °C.

30.2.2 Not applicable.

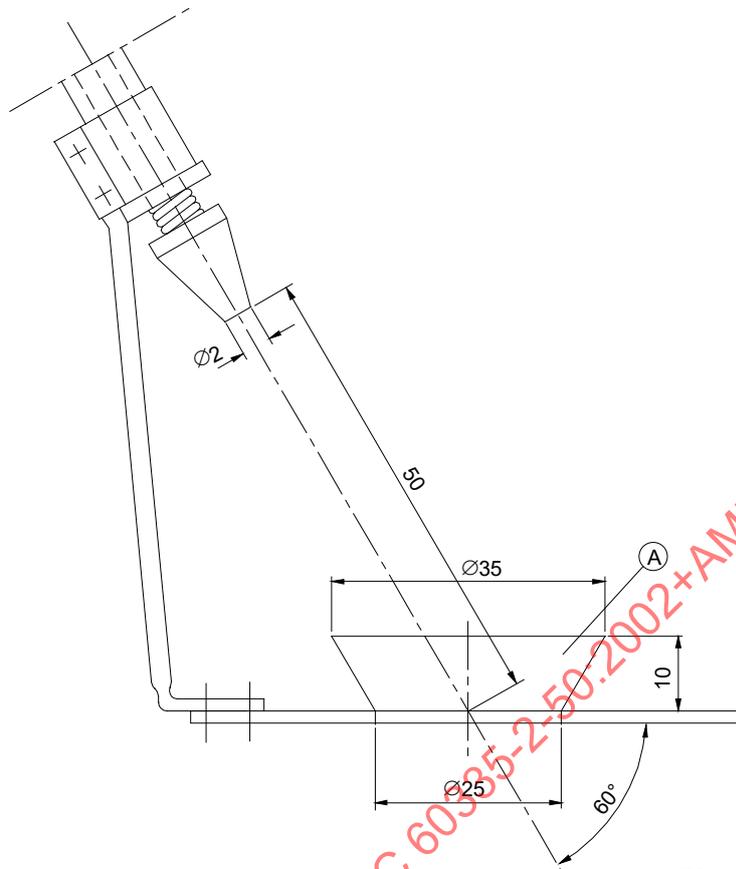
31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

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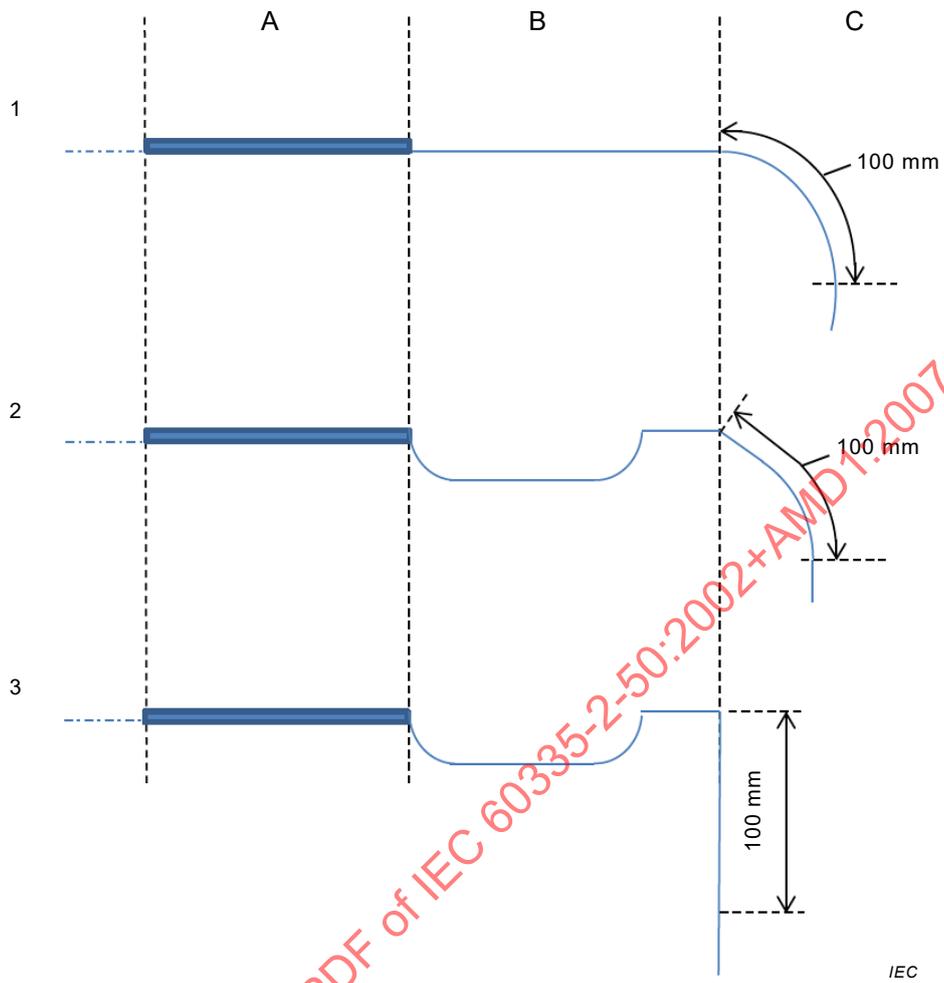
Dimensions in millimetres

Key

A Bowl

Figure 101 – Splash apparatus

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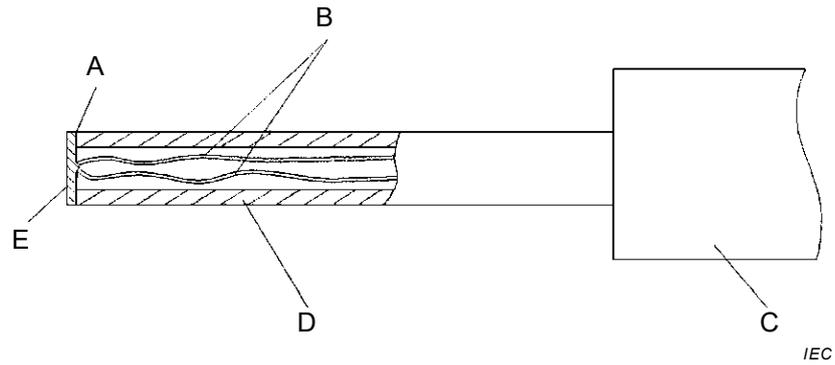


Key

- A functional surface
- B adjacent surface
- C external accessible surface

Figure 102 – Identification of surfaces for temperature measurement

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Key

- A adhesive
- B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K (chrome alumel)
- C handle arrangement permitting a contact force of $4\text{ N} \pm 1\text{ N}$
- D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
- E tinned copper disc: 5 mm diameter, 0,5 mm thick with flat contact face

Figure 103 – Probe for measuring surface temperatures

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Annexes

The annexes of Part 1 are applicable except as follows.

Annex N (normative)

Proof tracking test

6.3 *Addition:*

Add 250 V to the list of specified voltages.

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Annex P (informative)

Guidance for the application of this standard to appliances used in tropical climates

13 Leakage current and electric strength at operating temperature

13.2 Modification:

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

- for cord and plug connected appliances 0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher;
- for other appliances 0,5 mA or 0,5 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 0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher.

16 Leakage current and electric strength

16.2 Modification:

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

- for cord and plug connected appliances 0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher;
- for other appliances 0,5 mA or 0,5 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 0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher.

Bibliography

The bibliography of Part 1 is applicable.

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FINAL VERSION



**Household and similar electrical appliances – Safety –
Part 2-50: Particular requirements for commercial electric bains-marie**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
SAFETY –****Part 2-50: Particular requirements
for commercial electric bains-marie**

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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DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 60335-2-50 bears the edition number 4.2. It consists of the fourth edition (2002-11) [documents 61E/405/FDIS and 61E/417/RVD], its amendment 1 (2007-12) [documents 61E/588/FDIS and 61E/593/RVD] and its amendment 2 (2017-06) [documents 61/5364/FDIS and 61/5392/RVD]. The technical content is identical to the base edition and its amendments.

This Final version does not show where the technical content is modified by amendments 1 and 2. A separate Redline version with all changes highlighted is available in this publication.

This part of International Standard IEC 60335 has been prepared by IEC subcommittee 61E: Safety of electrical commercial catering equipment, of IEC technical committee 61: Safety of household and similar electrical appliances.

This fourth edition constitutes a technical revision.

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 fourth edition (2001) 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 bains-marie.

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 of Part 1 concerns an adjective, the adjective and the associated noun are also in bold .

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

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

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

The following differences exist in the countries indicated below.

- 6.1: Class 01 appliances are allowed (Japan).
- 6.2: For appliances intended to be installed in a kitchen, an appropriate degree of protection against harmful ingress of water is required according to their height of installation (France).
- 13.2: Leakage current limits are different (Japan).
- 16.2: Leakage current limits are different (Japan).
- Clause 21: For appliances intended to be installed in a kitchen, different values of impact energy are applicable according to the height of the impact point (France).

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

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

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

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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.

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.

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-50: Particular requirements for commercial electric bains-marie

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electrically operated commercial **bains-marie** 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;
- for appliances intended to be used outdoors, additional requirements may be necessary.

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*

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 101 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

Open-well and **wet-heat-type bains-marie** are filled with water to the **indicated level** and topped up during the test in accordance with the manufacturer's instructions. The appliance is operated with any control intended to be operated by the user set at maximum. If the water boils, the control is then adjusted to the lowest setting that maintains simmering. No covers or containers are fitted.

Dry-heat-type bains-marie are operated with any controls set at the maximum. Empty food containers are placed in the well but with the container covers removed.

Combined-type appliances are operated under the most unfavourable conditions.

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

bain-marie

an appliance with a well that is used for the storage of hot food in containers prior to serving. The containers are indirectly heated by hot air, steam or water in the well

3.102

open-well-type bain-marie

an appliance where the food containers rest in water in a heated well

3.103

wet-heat-type bain-marie

an appliance where the fitted food containers are heated by steam generated within the appliance. The pressure in the well or steam generator does not differ significantly from atmospheric pressure

3.104

dry-heat-type bain-marie

an appliance where the fitted food containers are heated by warm air generated within the appliance

3.105**indicated level**

a mark on the appliance to indicate the maximum liquid level for correct operation

3.106**installation wall**

a special fixed construction containing supply facilities for appliances installed in conjunction with it

3.107**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.

3.108**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.

5.10 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.*

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:

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:

If appliances have external **accessible surfaces**, 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

7.12 Addition:

If symbols IEC 60417-1-5021 (2002-10) and IEC 60417-5041 (2002-10) are marked on the appliance its meaning shall be explained.

The instructions shall include the substance of the following warning:

WARNING: Opening the drain cock will lead to the outflow of the hot contents of the bains-marie.

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.

Modification:

The instructions concerning persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge and children playing with the appliance are not applicable.

7.12.1 Replacement:

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 partially or completely 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.

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.

Compliance is checked by inspection.

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.

7.12.9 Not applicable.

7.14 Addition:

The height of the triangle used with 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 a **fixed appliance** is a **built-in appliance**.

7.101 Equipotential bonding terminals shall be marked with symbol 5021 of IEC 60417-1.

These markings 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 intended to be filled by hand or a manually operated tap shall be marked with an **indicated level**.

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.

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 starting the motor three times at a voltage equal to 0,85 times **rated voltage**, the motor being at room temperature at the beginning of the test.*

*The motor is started each time under the conditions occurring at the beginning of **normal operation** or, for automatic appliances, at the beginning of the normal cycle of operation, the motor being allowed to come to rest between successive starts. 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**.*

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

NOTE The supply source is such that during the test the drop in voltage does not exceed 1 %.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Addition:

NOTE 101 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.

11.3 Addition:

Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 103 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101. The probe is applied with a force of $4\text{ N} \pm 1\text{ N}$ 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:

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 Replace the test specification paragraph by the following.

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.

NOTE 101 The duration of the test may consist of more than one cycle of operation.

11.8 Addition:

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 ^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 102) 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.

^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.

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:

Appliances or any detachable electrical parts intended to be partially or completely immersed in water for cleaning are also subjected to the tests of 15.102.

NOTE 101 Appliances other than stationary or any detachable electrical parts not marked with a line indicating the maximum depth of immersion, or for which there is no warning against partial or complete immersion in the instruction sheet, are considered to be appliances intended to be completely immersed in water for cleaning.

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 101 is used. During the test, the water pressure is regulated so 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 moved around in such a way 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.

15.2 Replacement:

Appliances shall be constructed so that spillage of liquid in normal use does not affect their electrical insulation.

Compliance is checked by the following test using a spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent.

Any commercially available non-ionic rinsing agent may be used, but if there is any doubt with regards to the test results, the rinsing agent shall have the following properties:

- viscosity, 17 mPa·s;
- pH, 2,2 (1 % in water)

and its composition shall be

Substance	Parts by mass %
Plurafac ® LF 221 ¹	15,0
Cumene sulfonate (40 % solution)	11,5
Citric acid (anhydrous)	3,0
Deionized water	70,5

¹ Plurafac ® LF 221 is the trade name of a product supplied by BASF. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in 26.6, and other appliances are tested as delivered.

Appliances provided with an appliance inlet are tested with or without an appropriate connector in position, whichever is the more unfavourable.

Detachable parts are removed.

The water-well and steam generators of appliances intended to be filled by hand are completely filled with the solution and a further quantity equal to 15 % of their capacity but not more than 10 l is poured in steadily over a period of 1 min.

The food containers of **dry-heat-type bains-marie** are filled with the solution and placed in the appliance. A further quantity of 1 l is then added to each container.

Appliances intended to be filled by a manually operated tap or automatically are connected to a water supply having the maximum supply pressure indicated by the manufacturer. The means for controlling the incoming water is held fully open and the filling continued for 1 min after the first evidence of overflow, or until a further protective system operates to stop the inflow.

The appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of water on the insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.

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, if relevant, immediately emptied and then immersed completely in water having a temperature between 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 down 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 water has not entered the appliance to any appreciable extent.

NOTE When inspecting the appliance for the presence of water, special attention is paid to parts of the appliance in which electrical components are situated.

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:

NOTE 101 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 means of blotting paper, before applying the test voltage if the appliance would not otherwise withstand this test.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable.