IEC 60335-2-47

Edition 5.0 2021-11
REDLINE VERSION

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-47: Particular requirements for commercial electric boiling pans

IEC 60335-2-47:2021-11 RLV(en)

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INTERNATIONAL
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COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-47: Particular requirements for commercial electric boiling pans

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 redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60335-2-47:2002+AMD1:2008+AMD2:2017 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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IEC 60335-2-47 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2002, Amendment 1:2008 and Amendment 2:2017. This edition constitutes a technical revision.

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

a) the text has been aligned with IEC 60335-1:2020;
b) some notes have been converted to normative text, modified or deleted (Clause 1, 7.15, 11.7, 9.101, 10.1, 11.4, 11.7, 19.101, 20.1, 22.101, 22.113, 23.3, 27.2);
c) clarifications to some test specifications have been made (15.1.1, 15.2, 20.1, 22.101, 22.102);
d) exclusion of battery-operated appliances and appliances used in areas open to the public (Clause 1);
e) relocation of cleaning instructions from 7.12.1 to 7.12;
f) introduction of 22.120;
g) conciliation of the text of IEC 60335-2-47 with the other standards under IEC/TC61/MT32.

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

FDIS	Report on voting
61/6363/FDIS	61/6413/RVD

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

The language used for the development of this International Standard is English.

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

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This Part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) of that standard.

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

This Part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial electric boiling pans.

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;

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– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- 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 or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

– 6.1: Class 01 appliances are allowed (Japan).

– 13.2: Leakage current limits are different (Japan).

– 16.2: Leakage current limits are different (Japan).

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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.

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

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

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

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

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

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

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

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

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

NOTE 2 Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards.

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

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

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

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-47: Particular requirements for commercial electric boiling pans

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electrically operated commercial **boiling pans** ~~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 not intended for household and similar purposes. They are used for commercial processing of food in areas not open to the public, for example in kitchens of restaurants, canteens, hospitals and in commercial enterprises such as bakeries~~,~~ and 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~~ can be necessary;

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

– 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;

– **battery-operated appliances**.

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*

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ISO 3506-1, *Fasteners – Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs with specified grade and property classes*

ISO 3506-2, *Fasteners – Mechanical properties of corrosion-resistant stainless steel fasteners – Part 2: Nuts with specified grade and property classes*

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 Definitions relating to physical characteristics

3.1.4 *Addition:*

Note 101 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 water at 15 °C ± 5 °C to the **indicated level**.

Appliances with more than one programme are operated with the most severe programme. In addition, any control intended to be operated by the user is set at maximum until the water boils or the operating temperature is reached. The control is then adjusted to the lowest setting that maintains boiling or the operating temperature. Lids and covers are in position and closed.

Motors and **detachable electrical parts** incorporated in the appliance are operated ~~in the intended manner~~ under the most ~~severe~~ unfavourable conditions that can be expected in normal use taking into account the manufacturer's instructions.

3.1.101
rated pressure
maximum working pressure assigned by the manufacturer to the pressurized parts of the appliance

3.5 Definitions relating to types of appliances

3.5.101
boiling pan
appliance in which liquids contained in a vessel are heated to boiling point as part of a cooking process

Note 1 to entry: The pressure within the vessel can exceed atmospheric pressure.

Note 2 to entry: The vessel may be fixed or tilting.

3.5.102
atmospheric boiling pan
boiling pan in which the pressure within the vessel does not differ significantly from atmospheric pressure

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3.5.103
jacketed boiling pan
appliance having a double-walled vessel, the space between the inner and outer walls containing a heat transfer medium that is heated by heating elements

3.5.104
dual purpose boiling pan
appliance incorporating two vessels, the inner one being removable

Note 1 to entry: The appliance may be used with or without the removable vessel.

3.5.105
unjacketed boiling pan
appliance in which heating of the contents of the vessel is achieved by means other than via a heat transfer jacket

~~**3.106**~~
~~**rated pressure**~~
~~the maximum working pressure assigned by the manufacturer to the pressurized parts of the appliance~~

~~**3.107**~~
~~**indicated level**~~
~~a mark on the appliance to indicate the maximum liquid level for correct operation~~

~~**3.108**~~
~~**installation wall**~~
~~a special fixed construction containing supply facilities for appliances installed in conjunction with it~~

3.6 Definitions relating to parts of an appliance

3.~~109~~6.101
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.~~110~~6.102
adjacent surface
surface that is adjacent to a **functional surface** and which can become hot through conduction

3.8 Definitions relating to miscellaneous matters

3.8.101
indicated level
mark on the appliance to indicate the maximum liquid level for correct operation

3.8.102
installation wall
special fixed construction containing supply facilities for appliances installed in conjunction with it

4 General requirement

This clause of Part 1 is applicable.

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5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.5 *Addition:*

Tests are carried out with the vessel in the position of normal use for cooking.

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~~ can be needed for test purposes.

5.101 ~~*Appliances are tested as **heating appliances**, even if they incorporate a **motor**.*~~ *Appliances are tested as **heating appliances** when during a mode of operation electrical heaters are energized. If no electrical heaters are energized, the appliances are tested as **motor-operated appliances**.*

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 *Tests on **dual purpose boiling pans** are carried out with or without the inner vessel, whichever imposes the more severe condition, taking into account the manufacturer's instructions.*

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:*

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

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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

7.10 *Addition:*

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

7.12 *Addition:*

The instructions of **boiling pans** except **atmospheric boiling pans** shall include the substance of the following warning.

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

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 boiling pan.

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.

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

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

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

7.12.1 ~~*Replacement*~~ *Addition:*

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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.~~

For appliances that are permanently connected to fixed wiring and for which leakage currents ~~may~~ can 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~~ residual current devices (RCD), 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~~ 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 a **fixed appliance** is a **built-in appliance**.~~

7.101 Equipotential bonding terminals shall be marked with symbol ~~5021 of IEC 60417-1~~ IEC 60417-5021 (2002-10).

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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 Vessels 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~~ can 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.*~~

*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 **room temperature** after each test.*

*The ~~motor~~ appliance 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~~ 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 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 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).*

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

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

11.4 *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~~ unfavourable 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~~ rise of the components for which the temperature rise limits were exceeded are measured.*

~~NOTE 101 See also 11.7.~~

11.7 *Replacement:*

Appliances are operated until steady conditions are established.

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

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.

Agitator motors are operated continuously unless provided with a timer, in which case they are operated for the maximum time allowed by the timer, or until steady conditions are established, whichever is ~~shorter~~ the shortest.

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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*~~ *Modification:*

~~*During the test the pressure relief device shall not operate.*~~

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

Addition:

During the test, the pressure relief device shall not operate.

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*~~ *of 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~~ Charging of metal-ion batteries

This clause of Part 1 is not applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

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*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.

15.1.1 *Addition:*

In addition, ~~IPX0, IPX1, IPX2, IPX3 and IPX4~~ appliances, except those marked IPX5 and IPX6 are subjected for 5 min to the following splash test.

The apparatus shown in ~~Figure 101~~ Figure 103 is used. The appliance is placed in normal position of use and adjustable feet shall be set in accordance with the instructions for use to the most unfavourable height.

For appliances normally used on the floor, the bowl is placed on the floor and is moved around in such a way as to splash the appliance from all directions. 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~~ not positioned underneath the appliance.

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~~ the bowl is placed on the same plane where the appliance is placed and is moved around in such a way as to splash the appliance from all directions. During the test, the water pressure is so regulated that the water splashes up 100 mm above the bottom of the bowl. The bowl is not positioned underneath the appliance.

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~~ Modification:*

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~~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.*~~

~~***Detachable parts** are removed.*~~

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

Appliances with vessels 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.

*In addition, **jacketed boiling pans** are subjected to the following test.*

The filling hole for the heat transfer medium is closed and 2 l of the spillage solution is poured steadily over the filling hole for a period of 1 min.

~~*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.

~~[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.~~

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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 position. 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.

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.*

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:*

Compliance is also checked by the test of 19.101.

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~~ unfavourable setting irrespective of the manufacturer's instructions.

~~*Appliances provided with a control limiting the pressure during the tests of Clause 11 are also subjected to the tests of 19.4 with this control rendered inoperative.*~~

~~NOTE 101 Continuous blowing-off of the pressure relief device is in itself disregarded.~~

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19.2 *Addition:*

The appliance is operated without water in the vessel and the controls are set at maximum.

***Jacketed boiling pans** fitted with pressure relief devices are operated until the pressure in the jacket is stabilized.*

19.34 *Addition:*

Any adjustable temperature or pressure control within the appliance that is preset for correct operation, but is not locked in position, is adjusted to its most unfavourable position.

*If it is possible for the heat transfer medium of **jacketed boiling pans** to leak out or escape by evaporation or be drained off, the test is also made with the vessel filled with water to the **indicated level** and the jacket empty.*

19.101 *Appliances provided with a control limiting the pressure during the tests of Clause 11 are also subjected to the tests of 19.4 with this control rendered inoperative.*

During the test the pressure relief device is allowed to operate.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Addition:*

Covers, lids and accessories are placed in the most unfavourable positions.

~~NOTE 101 Any spillage of liquid is ignored.~~

Modification:

The test with the angle of inclination increased to 15° is not carried out.

20.2 ~~*Modification:*~~

~~Add the following after the first requirement paragraph.~~

~~This applies also to parts necessary to effect the tilting operation, i.e. handles or wheels.~~

Addition:

Add the following after the first paragraph in the requirement.

This applies also to parts necessary to perform the tilting movement, i.e. handles or handwheels.

20.101 **Boiling pans** with moving parts intended for mixing, stirring, etc., having a kinetic energy of more than 200 J, shall be provided with an interlock to stop the moving parts when the lid or guard has been opened by more than 50 mm.

It shall not be possible to release the interlock by means of test probe B of IEC 61032 with a force of 5 N.

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Alternatively, if the peripheral speed of the stirring device does not exceed 1 m/s, the appliance may be provided with an interlock or similar device that can be easily actuated by the user without the use of his hands. The interlock or device shall be **non-self-resetting** and shall provide **all-pole disconnection** from the supply.

Compliance is checked by inspection and by actuating the safety devices.

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.7 *Replacement:*

Boiling pans and **jacketed boiling pans** in which the vessel or jacket operates at a pressure in excess of atmospheric pressure (overpressure) shall incorporate a suitable pressure relief device that prevents excessive pressure.

*Compliance is checked by operating the appliance at **rated power input** with the pressure controls rendered inoperative.*

*The pressure relief device shall operate during this test so as to prevent the internal pressure exceeding the **rated pressure** by more than 20 %.*

~~**22.13** *Addition:*~~

~~Lids and their grips shall be constructed so that, when opening and closing them, scalding by steam is obviated.~~

~~*Compliance is checked by inspection.*~~

22.101 For ~~3~~ multi-phase appliances, **thermal cut-outs** protecting circuits with heating elements and those for motors of which the unexpected starting ~~may~~ can cause a hazard, shall be of the non-self-resetting, trip-free type and shall provide **all-pole disconnection** from 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~~ can 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.~~ Trip-free is an automatic action that is independent of manipulation or position of the actuating member.

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.

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Compliance is checked by inspection and by manual test~~,~~ and by rupturing the capillary tube in such a way that the rupture does not seal the 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 shall be coloured red.

Compliance is checked by inspection.

22.103 The operating pressure of pressurized parts of the appliance shall not exceed the **rated pressure**.

Compliance is checked during the test of Clause 11.

22.104 The pressure relief device shall be positioned or constructed so that its operation does not cause injury to persons or damage to surroundings. Its construction shall be such that it cannot be made inoperative or set to a higher relief pressure without the aid of a special **tool**.

Compliance is checked by inspection.

22.105 It shall not be possible to open the lid or cover of a pressurized appliance until the pressure has been reduced to approximately atmospheric pressure.

Compliance is checked by inspection and by manual test.

22.106 Appliances shall be provided with a means whereby exhausted steam is condensed automatically before it is released to the drain.

Compliance is checked by inspection.

22.107 Pressurized appliances shall incorporate a vacuum release valve to prevent a partial vacuum forming, unless it is designed for vacuum operation.

Compliance is checked by inspection.

22.108 **Jacketed boiling pans** shall incorporate a vacuum release valve to prevent a partial vacuum forming within the jacket unless it is designed for vacuum operation.

Compliance is checked by inspection.

22.109 Hinged lids shall be protected against accidental ~~falling~~ closing.

Compliance is checked by inspection and by manual test.

22.110 Appliances with tilting containers shall be provided with a mechanism that prevents accidental tilting from any position. It shall not be possible to adversely influence the tilting action other than by the intended means.

Control devices used to operate the mechanism shall be located and protected in such a way that they cannot be operated accidentally.

Compliance is checked by inspection and by applying a force of 340 N at any point to the vessel.

22.111 Appliances fitted with lifting devices shall be constructed so that the drive mechanism automatically disengages or stops at its fully up or fully down position.

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Compliance is checked by inspection.

22.112 The rim of tilting **boiling pans** shall be constructed so that the liquid is poured out in an even stream.

Compliance is checked by manual test.

22.113 Drain cocks and other emptying devices for hot liquids shall be constructed so that they cannot be opened inadvertently.

This requirement is met if the emptying device handle is such that

– when released, it returns the emptying device automatically to the closed position;
– it is of the wheel type; or
– it is placed in a recess such that it cannot be placed in the open position by means of test probe B of IEC 61032 using a single action with a force of 10 N.

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 is placed in a recess.~~

22.114 Pressurized parts of appliances shall be capable of withstanding the **rated pressure**.

*Compliance is checked by subjecting the pressurized parts for 30 min to a hydrostatic pressure equal to 1,5 times the **rated pressure**. All outlets are sealed and any pressure relief devices rendered inoperative. Means other than water may be used to create the hydrostatic pressure.*

During the test the pressurized parts shall show no signs of leaks or permanent deformation, nor shall they burst.

22.115 Means provided to allow drainage of liquid from appliances shall discharge the liquid in such a manner that electrical insulation is not affected.

Compliance is checked by inspection and by manual test.

22.116 **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.*

22.117 The level to which manually filled ~~vessels~~ containers have to be filled shall be so located as to be readily visible when filling.

Compliance is checked by inspection.

22.118 Baskets, lifting or tilting devices shall be constructed so as to keep them safely in any position and a safe handling is possible. The drive mechanism shall automatically disengage or stop at its end positions.

Compliance is checked by inspection and manual test.

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22.119 Lids and their grips shall be constructed so that, when opening and closing them, scalding by steam is avoided.

Compliance is checked by inspection.

22.120 Thermal controls shall not be incorporated in connectors.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Addition:*

~~*When*~~ *If 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.~~

The rate of flexing may be reduced if it is not possible to move the movable part of the appliance at the given rate, due to the mass of the movable part.

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 in such a way that the rupture does not seal 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.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Modification:*

Appliances shall not be provided with an appliance inlet.

25.3 *Addition:*

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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 connection can be done after the appliance has been installed in accordance with the manufacturer's instructions.

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

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.*~~

If the appliance uses a **type X attachment** the instructions shall state the size and type of the **supply cord** to be used.

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, except small fixed exposed metal parts such as name-plates and similar parts;

– allow the connection of a conductor having a nominal cross-sectional area of up to 10 mm^2 ; and

– 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.~~

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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.

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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.

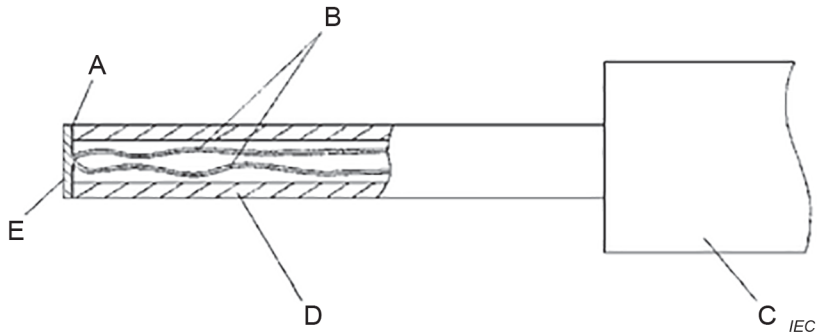
30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



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 N ± 1 N
D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm
E tinned copper disc: 5 mm diameter, 0,5 mm thick with flat contact face

Figure ~~103~~ 101 – Probe for measuring surface temperatures

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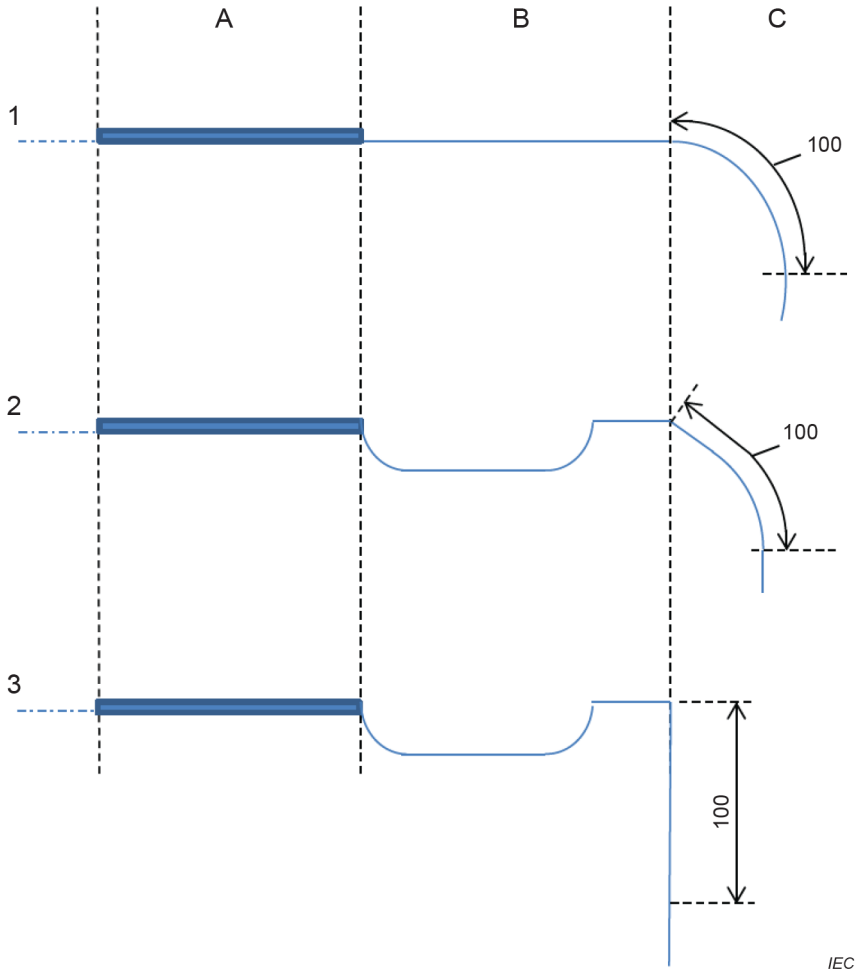
Dimensions in millimetres



Key

A functional surface

B adjacent surface

C external accessible surface

Figure 102 – Identification of surfaces for temperature measurement

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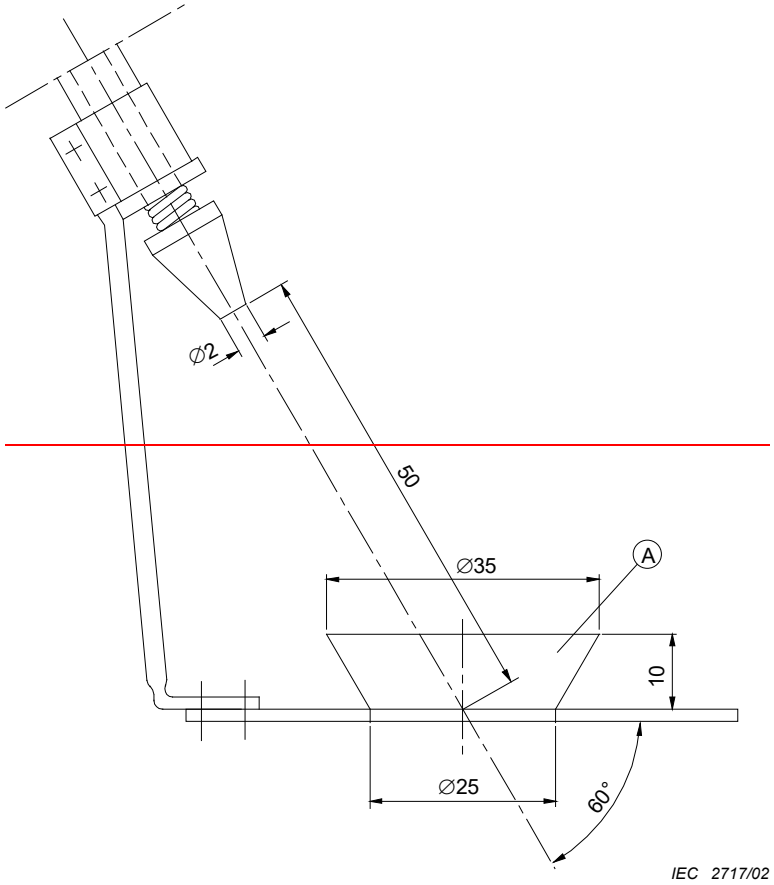
Dimensions in millimetres



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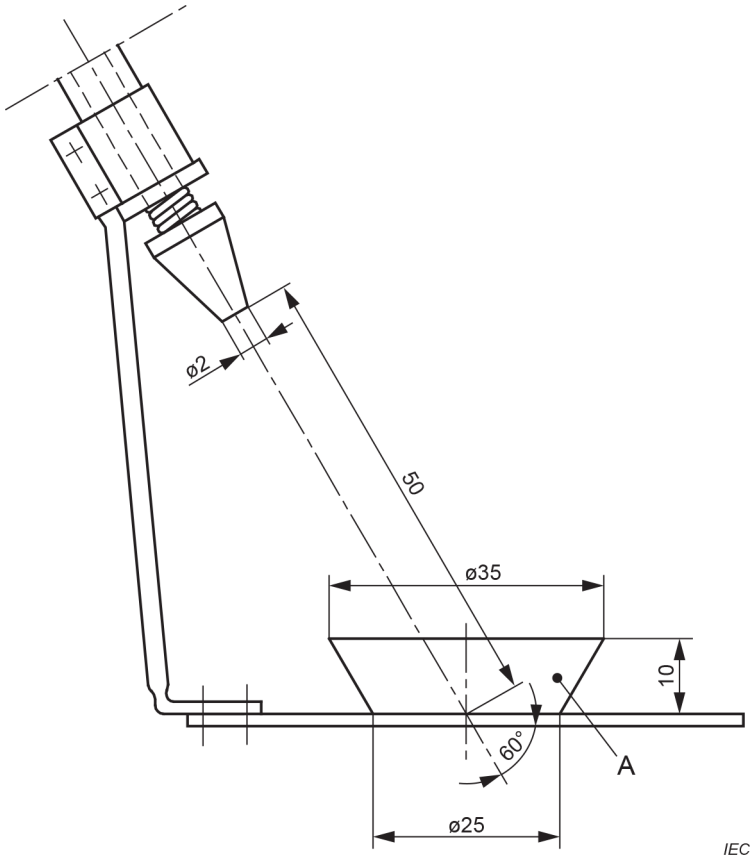

Key

A Bowl

Figure ~~101~~ 103 – Splash apparatus

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