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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Safety –
Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Household and similar electrical appliances – Safety – Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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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 60335-2-49:2002+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.

IEC 60335-2-49 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) introduction of requirements for appliances intended for use in areas open to the public, including external accessible surface temperatures (Clause 1, 7.12, 11.8, Table 102);
c) exclusion of battery-operated appliances (Clause 1);
d) clarification of applicable standard for appliances for use by laymen (Clause 1, 7.12);
e) relocation of cleaning instructions from 7.12.1 to 7.12;
f) relocation of 24.101 to 22.106;
g) conciliation of the text of IEC 60335-2-49 with other standards under IEC/TC61/MT32;
h) some notes have been converted to normative text, modified or deleted (Clause 1, 7.1, 7.15, 11.3, 11.7, 15.2, 19.2, 22.101, 23.3);
i) additional requirements for measurement of input current;
j) clarification of the testing procedure in 15.1.1;
k) clarification of the test conditions in 20.1 and 23.3;
l) clarifications of the requirements in 25.3.

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

FDIS	Report on voting
61/6365/FDIS	61/6411/RVD

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

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

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

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

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

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

This Part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial electric appliances for keeping food and crockery warm.

When a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

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

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

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

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

- reconfirmed,
- withdrawn,
- 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).

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

INTRODUCTION

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

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

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

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

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

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may 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 ~~generic standards~~ group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. ~~For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.~~

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

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 appliances for keeping food and crockery warm ~~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.

Examples of appliances that are within the scope of this standard are:

– **hot cupboards**, with or without **heated tops**;
– **heated tops**;
– **heated display cases**;
– **heated crockery dispensers**;
– **heated tables**;
– **radiant heaters**.

~~NOTE 101~~ These appliances are not intended for household and similar purposes. They are used for commercial purposes, processing of food ~~and/or rethermalising it~~, also in **areas 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;
~~– for appliances intended to be used outdoors, additional requirements may be necessary.~~
– 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;

– commercial electric bains-marie (IEC 60335-2-50);
– **battery-operated appliances**;
– warming plates and similar appliances for household use covered by IEC 60335-2-12 used in the following environments by laymen:
  • staff kitchen areas in shops, offices and other working environments;
  • farm houses;
  • hotels, motels and other residential type environments;
  • bed and breakfast type environments.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60436, *Electric dishwashers for household use – Methods for measuring the performance*

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, *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

Appliances are operated empty and with any controls intended to be operated by the user set at the maximum.

If the appliance cannot be operated empty, then the manufacturer's instructions are taken into account.

Doors, covers or lids, if any, are placed in their intended positions.

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.

Appliances incorporating **induction heating sources** are operated with the **induction crockery** placed on **induction trays**. All tray supports are loaded, but partial up to full load shall be possible.

All controls are set to maximum, and the **induction crockery** is half-filled with initially cold water. Covers (cloches) are in their position.

The appliances consist of several units, which can form up to three separated modules; they are connected together during operation. These units are the heating module with the **induction heating source**, the rack with the **coil carriers** and the enclosure with the supports for the **induction trays** including the **induction crockery**.

3.5 Definitions relating to types of appliances

3.5.101
hot cupboard
appliance that is used for maintaining the temperature of hot food and for the warming of crockery

~~**3.102**~~
~~**heated top**~~
~~the top surface of a **hot cupboard**, that is designed to maintain the required temperature. It may be heated indirectly by the **hot cupboard** heating elements or directly by separate heating elements~~

3.~~103~~5.102
heated display case
hot cupboard in which food is displayed, the heated food being served from the display

3.~~104~~5.103
heated crockery dispenser
appliance designed specifically for the storage, warming and dispensing of plates, etc.

~~**3.105**~~
~~**installation wall**~~
~~a special fixed construction containing supply facilities for appliances installed in conjunction with it~~

3.~~106~~5.104
heated table
appliance designed for warm-holding on the surface

3.~~107~~5.105
radiant heater
stationary appliance for keeping food and crockery warm by means of radiant heat

Note 1 to entry: A part of the appliance can be swivelling.

3.6 Definitions relating to parts of an appliance

3.~~108~~6.101
heating unit
any part of an appliance that fulfils an independent cooking or heating function

3.~~109~~6.102
induction heating source
heating source that operates by inducing eddy currents in **induction crockery**

3.~~110~~6.103
coil carrier
insulation device containing the induction winding

3.~~111~~6.104
induction crockery
crockery suitable to be heated by induction for heating up or keeping food warm

3.~~112~~6.105
induction tray
tray adapted to **induction crockery**, as recommended by the manufacturer

3.~~113~~6.106
functional surface
surface that is intentionally heated by an internal heat source and has to be hot to carry out the function for which the appliance is intended

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

3.~~114~~6.107
adjacent surface
surface that is adjacent to a **functional surface** and which can become hot through conduction

3.6.108
heated top
top surface of a **hot cupboard**, that is designed to maintain the required temperature.

Note 1 to entry: The **heated top** can be heated indirectly by the **hot cupboard** heating elements or directly by separate heating elements.

3.8 Definitions relating to miscellaneous matters

3.8.101
area open to the public
area in which the general public, including children, can have access

Note 1 to entry: Examples are canteens and self-service restaurants.

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.

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~~ can be needed for test purposes.

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

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

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

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 incorporating **induction heating sources** shall ~~also~~ be marked with:

– the operating frequency or operating frequency range, in kilohertz (kHz) of the **induction heating sources**;
– the total power input of all the induction **heating units** that can operate simultaneously, in watts (W) or kilowatts (kW), unless this is indicated in the instructions;
– the total power input of all the non-induction **heating units** that can operate simultaneously, in watts (W) or kilowatts (kW), unless this is indicated in the instructions.

~~NOTE 101~~ The total power input to be marked or ~~declared~~ indicated in the instructions is the highest power input that any switch arrangement will allow.

Covers ~~giving~~, that if removed, can give direct access to induction coils shall be marked with symbol IEC 60417-5140 (2003-04), or with the substance of the following ~~warning~~:

~~Caution – MAGNETIC FIELD~~

Caution: Magnetic field

~~NOTE 102~~ If it is not possible to mark ~~these warnings~~ the symbol or caution on the cover, ~~they may~~ it can be placed close to the cover-retaining screws.

If appliances have external **accessible surfaces**, for which temperature rise limits are specified in Table 101 or Table 102 and for which the provisions of footnote b to Table 101 or Table 102 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

 [symbol IEC 60417-5140 (2003-04)] non-ionizing electromagnetic radiation

7.12 *Addition:*

The manufacturer shall declare that the appliance is also intended to be used in an **area open to the public** or, if the appliance is not suitable for use in an **area open to the public,** the instruction shall include the substance of the following warning:

WARNING: This appliance shall not be installed where the public has access.

The instructions of appliances provided with wheels or similar means shall also state the maximum load, in kilograms (kg), of the appliance.

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.

If any of the symbols IEC 60417-5021 (2002-10) or IEC 60417-5041 (2002-10) and IEC 60417-5140 (2003-04) ~~is~~ are marked on the appliance, its meaning shall be explained.

The instructions for appliances incorporating **induction heating sources** shall include the substance of the following warning and information:

– WARNING: If the surface of coil carriers changes to darker colour or shows cracks, immediately disconnect the appliance from the supply.
– metallic objects such as kitchen utensils, cutlery, etc., shall not be placed on the induction tray within zones provided for the induction crockery since they could get hot;
– only use induction crockery and induction trays recommended by the manufacturer;
– users with heart pacemakers should consult ~~with~~ the manufacturer (unless specific details are given).

The instructions shall also 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~~,~~ and butcheries, ~~etc.,~~ but not for continuous mass production of food.

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

The instructions shall include the substance of the following:

– This appliance is not intended to be used by laymen in household and similar applications such as:
  - staff kitchen areas in shops, offices and other working environments;

- farm houses;
- in hotels, motels and other residential type environments;
- bed and breakfast type environments.

Modification:

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

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

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

For appliances incorporating swivelling **radiant heaters**, the installation instructions shall include detailed information concerning the area of swivelling with regard to the surrounding conditions. Information shall be given on how to limit the swivelling area by the installer.

The operation of appliances incorporating **induction heating sources** requires an increased instruction of the personnel. In addition, the instructions shall state that any repairs shall be carried out only by persons trained or recommended by the manufacturer.

For **class I 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 instruction sheet shall give recommendations regarding the rating of **protective devices**, such as ~~earth leakage relays~~ residual current devices (RCD), to be installed.

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.

The height of symbol IEC 60417-5140 (2003-04) shall be at least 10 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.

~~NOTE 101 An example of such a **fixed appliance** is a **built-in appliance**.~~

For appliances incorporating **induction heating sources** in modular design, the additional label shall be fixed to the heating module (generator).

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**.

7.101 Equipotential bonding terminals shall be marked with symbol ~~5021 of IEC 60417-1~~ IEC 60417-5021 (2005-06).

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 If a swivel **radiant heater** can be swung over adjacent areas or appliances, the instructions for use and installation shall indicate this range. If the temperature rise of the top of the adjacent area or appliance exceeds 65 K during the tests of Clause 11, or 125 K during the tests of Clause 19, the installation instructions provided by the manufacturer shall include the substance of the following warning, that shall also be included on a ~~non-~~permanent label attached to the appliance:

WARNING: ~~If this radiant heater is positioned adjacent to other areas or appliances, it is recommended that, within the range of the radiation, these areas or appliances be made of non-combustible material, otherwise, they shall be clad with a non-combustible heat-insulating material, and attention is to be paid to fire prevention regulations.~~

Where this appliance is to be positioned so that walls, partitions, kitchen furniture, decorative finishes, etc., are in the range of the heat radiated from the adjustable heater, it is recommended that they are made of non-combustible material. If not, they shall be clad with a suitable non-combustible heat-insulating material.

Compliance is checked by inspection.

7.103 Food warming areas of **radiant heaters** adjacent to the appliance shall be permanently marked if the temperature rise during Clause 11 exceeds 65 K. This marking is not required if the swivelling area is between a bank of other appliances.

Compliance is checked by inspection.

7.104 The side of the **radiant heater** case facing the user (front side) shall be permanently marked with symbol IEC 60417-5041 (2002-10).

Compliance is checked by inspection.

7.105 The zones on **induction trays** where the **induction crockery** is to be placed shall be marked permanently, e.g. by an appropriate design.

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 is 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 input terminals of the appliance.*

The tests are carried out three times.

In all cases, the motor shall start and it shall function in such a way that safety is not affected~~,~~ and ~~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 *Modification:*

Instead of the first paragraph of the requirement, the following applies:

The power input of appliances without **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than the deviation shown in Table 1.

The power input of appliances having only **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than 10 %.

The measurement is made before the controls are adjusted to the reduced setting.

For appliances incorporating ***induction heating sources*** *and non-induction heating sources, the following applies:*

*The power input of the **induction heating sources** and the non-induction heating sources is measured separately, in each case using a combination of **heating units** that can be on at the same time to give the highest power input. For the **induction heating sources**, the measurement is made before the controls are adjusted to the reduced setting.*

*For **induction heating sources**, the power input so measured shall not deviate from the **rated power input** marked or declared by the manufacturer (see 7.1) by more than 10 %~~. For~~ and in the case of non-induction heating sources~~, the power input so measured shall not~~ deviate from the **rated power input** marked or declared by the manufacturer (see 7.1) by more than the deviation shown in Table 1 for **heating appliances**.*

*In addition, the power input of the appliance when the **induction heating sources** and non-induction heating sources are operated simultaneously shall not deviate from the **rated power input** by more than 10 %.*

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).*

10.2 *Modification:*

Instead of the first paragraph of the requirement, the following applies:

The current of appliances without **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated current** by more than the deviation shown in Table 2.

*For appliances incorporating **induction heating sources** and non-induction heating sources, the following applies.*

*The current of the **induction heating sources** and the non-induction heating sources is measured separately, in each case using a combination of **heating units** that can be on at the same time to give the highest current. For the **induction heating sources**, the measurement is made before the controls are adjusted to the reduced setting.*

*For non-induction heating sources, the current so measured shall not deviate from the **rated current** marked or declared by the manufacturer (see 7.1) by more than the deviation shown in Table 2 for **heating appliances**.*

*In addition, the current of the appliance when the **induction heating sources** and non-induction heating sources are operated simultaneously shall not deviate from the **rated current** by more than 10 %.*

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

11 Heating

This clause of Part 1 is applicable except as follows.

11.1 *Addition:*

*For **radiant heaters**, 11.101 applies.*

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:*

~~NOTE 101 If the measurements can be unduly influenced by emissions from an **induction heating source**, i.e. the magnetic field, this must be taken into account.~~

~~In general, the use of thermocouples is not recommended because of the expected faulty heating-up of the thermocouples caused by the **induction heating source**. For example, the temperature rise of the **induction heating source** can be determined by using a platinum resistance, preferably of high resistance, with twisted connecting wires. The platinum resistances are placed on the hottest point of the winding so as to influence as little as possible the temperature to be measured.~~

*If the magnetic field of an **induction heating source** unduly influences the results, the temperature rises can be determined using platinum resistances with twisted connecting wires or any equivalent means.*

*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 and Table 102. 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:*

*The non-induction **heating units** of the appliance are operated under **normal operation** at 1,15 times the power input marked ~~or declared~~.*

*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.*

*Induction **heating units** are operated simultaneously and supplied separately at the most unfavourable voltage between 0,94 times minimum **rated voltage** and 1,06 times maximum **rated voltage**.*

*If it is not possible to switch on all heating elements or **induction heating sources** 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.*

11.7 *Replacement:*

*Appliances incorporating **induction heating sources** are operated at maximum setting of the controls for one cycle, which consists of a heating-up phase and a keeping warm phase.*

*Appliances without **induction heating sources** are operated until steady conditions are established.*

~~NOTE 101 The duration of the test on non-induction appliances 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.

11.8 ~~*Addition*~~ *Modification:*

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

For appliances intended to be installed in ***areas open to the public****, the temperature shall not exceed the values shown in Table 102.*

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;*
- *crockery since it is considered to be a* ***functional surface****;*
- ***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.*

Table 102 – Maximum temperature rises of external accessible surfaces for appliances intended to be installed in areas open to the public under normal operating conditions

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

[a] *The following surfaces or elements shall not be taken into consideration:*
- ***functional surfaces**;*
- *handles or control knobs including keypads, keyboards and the like: part of the equipment that a user needs to touch to operate or adjust the equipment. The equipment has to be installed according to the manufacturer's instructions;*
- *surfaces within 5 mm of touch controls regardless of their shape;*
- *surfaces within 25 mm of the outline of the **functional surfaces**;*
- *underside surfaces that are not accessible to a 75 mm diameter probe having a hemispherical end;*
- *lids and covers.*

[b] *When the required values are not met, the maximum temperature rise shall not be higher than two times the values indicated, 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 of enamel, powder 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 the coated metal or of glass and ceramic material apply.*

11.101 *For **radiant heaters**, the temperature rise limit of 65 K applies to the areas, including walls, which are reached by the radiation. If this temperature rise limit is exceeded, the requirements of 7.102 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:*

*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.

~~*During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl, the bowl is placed on the floor for appliances normally used on the floor. For all other appliances, on a horizontal support 50 mm below the lowest edge of the appliance, the bowl is so moved around as to splash the appliance from all directions.*~~

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 the 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 not positioned underneath the appliance.

For all other appliances, 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 to 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:*~~

~~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 no-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.*~~

~~*A litre of the solution is poured steadily over a period of 1 min on to the centre of any heated surface.*~~

~~NOTE 101 **Crockery dispensers** are not tested.~~

~~*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.*~~

Modification:

One litre of the spillage solution is poured steadily over a period of 1 min on to the centre of any heated surface.

***Crockery dispensers** are not tested.*

~~[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.~~

15.101 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.

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:*

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 incorporating **induction heating sources** are also subjected to the tests of 19.101 and 19.102.*

*For **radiant heaters**, 19.103 applies.*

19.2 *Addition:*

Fan motors are rendered inoperative.

Doors or lids are open or closed, whichever is the more unfavourable.

*Surfaces incorporating heating elements and **heated tops** heated indirectly by the **hot cupboard** heating elements are covered with a layer of felt having a mass of 4 kg/m^2 ± 0,4 kg/m^2 and a thickness of 25 mm.*

~~NOTE 101~~ *However, surfaces heated by a radiation source not incorporated in the surface are not covered.*

*Detachable reflectors and similar **detachable parts** are placed in any position or removed, whichever is the more unfavourable.*

*Appliances incorporating **induction heating sources** are operated fully loaded, with empty **induction crockery** without covers (cloches) in their position, until steady conditions are established.*

19.3 *Addition:*

***Induction heating sources** are supplied with a voltage of 1,06 times the **rated voltage**.*

~~**19.8** *Addition:*~~

~~*Compliance is checked as for 19.7.*~~

19.13 ~~*Modification:*~~

~~*For appliances incorporating **induction heating sources** having **working voltages** above 250 V, the following test voltages apply:*~~

- ~~*1 000 V is increased to 1,2 x U + 700 V;*~~
- ~~*2 750 V is increased to 1,2 x U + 2 450 V;*~~
- ~~*3 750 V is increased to 2,4 x U + 3 150 V.*~~

~~*where U is the **working voltage**.*~~

Addition:

The temperature of the windings of the induction ~~windings~~ coils shall not exceed the values ~~specified~~ shown in Table 8 of 19.7.

19.101 Appliances incorporating **induction heating sources** shall be constructed so that the risk of fire, mechanical hazard or electric shock is obviated as far as is practicable in the event of incorrect operation or the development of defects in control devices or circuit components.

*Compliance is checked by applying any form of operation or any defect in the relevant circuits which may be expected in normal use while the appliance is operated under **normal operation** at **rated voltage** or at the upper limit of the **rated voltage range**. Only one fault condition is reproduced at a time, the tests being made consecutively.*

NOTE Examples ~~for~~ of fault conditions are:

– drop-out of contactors and of electromagnetic components;

– failure of motors to start;

– drop in voltage supply, re-appearance of the voltage, voltage interruptions of up to 0,5 s;

– fault conditions specified in 19.11, as applicable.

Examination of the appliance and its circuit diagrams will generally show the fault conditions to be simulated.

19.102 Appliances incorporating **induction heating sources** shall be constructed so that a small piece of metal being situated on a **coil carrier** shall not cause the temperature of the windings of this **coil carrier** to exceed the relevant values specified in Table 8 of 19.7, or shall not lead to a damage of the insulation of this **coil carrier**.

*Compliance is checked by placing a piece of flat mild steel, 2 mm thick and having dimensions 100 mm × 20 mm, in the most unfavourable situation on a **coil carrier**. The appliance is supplied at **rated voltage**, all controls are set to their maximum.*

19.103 *For **radiant heaters**, the limit of 125 K temperature rise applies to the areas, including walls, which are reached by the radiation. If this temperature rise limit is exceeded, the requirements of 7.102 apply.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

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

Addition:

Appliances provided with doors, covers or lids, racks and other accessories are tested with doors open or closed, racks partially or fully extended, with or without covers or lids or other accessories, whichever is the more unfavourable.

Appliances provided with wheels or similar means are also subjected to the following test.

***Crockery dispensers** are loaded with dishes so that the load obtained is equal to one-third of the load declared by the manufacturer. The load is placed on the highest usable parts of the appliance. The dishes used are as specified in IEC 60436. If special dishes are specified by the manufacturer, these are used.*

Other appliances are loaded with one-third of the load declared by the manufacturer, placed on the highest usable parts of the appliance.

Appliances provided with doors, covers or lids and other accessories are tested with doors open or closed, with or without covers or lids or other accessories, whichever is the more unfavourable.

The appliance is then placed in the most unfavourable position against an edge with a height equal to the radius of the wheels plus 10 mm. If the wheels differ in size, that edge height that is the most unfavourable is chosen.

A force equal to 8 % of the mass of the fully loaded appliance is applied horizontally to the middle of the top edge of the appliance but not higher than 900 mm, in the most unfavourable direction.

The appliance shall not tilt.

20.2 *Addition:*

Moving parts of motors and fan assemblies of appliances where the fan motor can be operated when the door is open shall be arranged or enclosed so that adequate protection against injury is provided during normal use including cleaning.

It shall not be possible to touch the moving parts of the fan.

Compliance is checked by test probe 41 of IEC 61032 applied with a force of 10 N.

20.101 Guards fitted over motors and fan assemblies in order to comply with the requirements of 20.2 shall not be **detachable parts** unless:

– a suitable interlock assembly is fitted that prevents the motor or fan from operating when the guard is removed;

– the guard forms an integral part of the internal lining.

Compliance is checked by inspection and by manual test.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

The impact test is also applied to the coil carriers.

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 ~~three~~ 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 and 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-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 and 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.

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

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, 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 **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.*

22.105 **Induction heating sources** shall have adequate visual or audible warning that the control is in the "ON" position. The position of a control knob does not, in itself, constitute an adequate warning.

Compliance is checked by inspection.

~~NOTE The position of a control knob does not, in itself, constitute an adequate warning.~~

22.106 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~~ is 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 ~~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:*

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.~~

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~~ Table 103 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~~ 103 – 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.

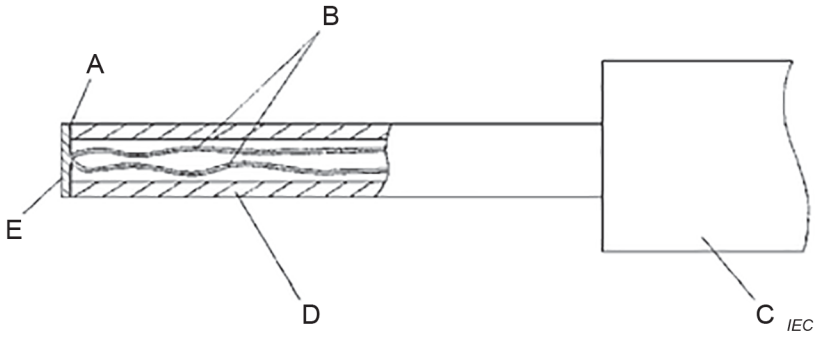
30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K ~~(chrome alumel)~~

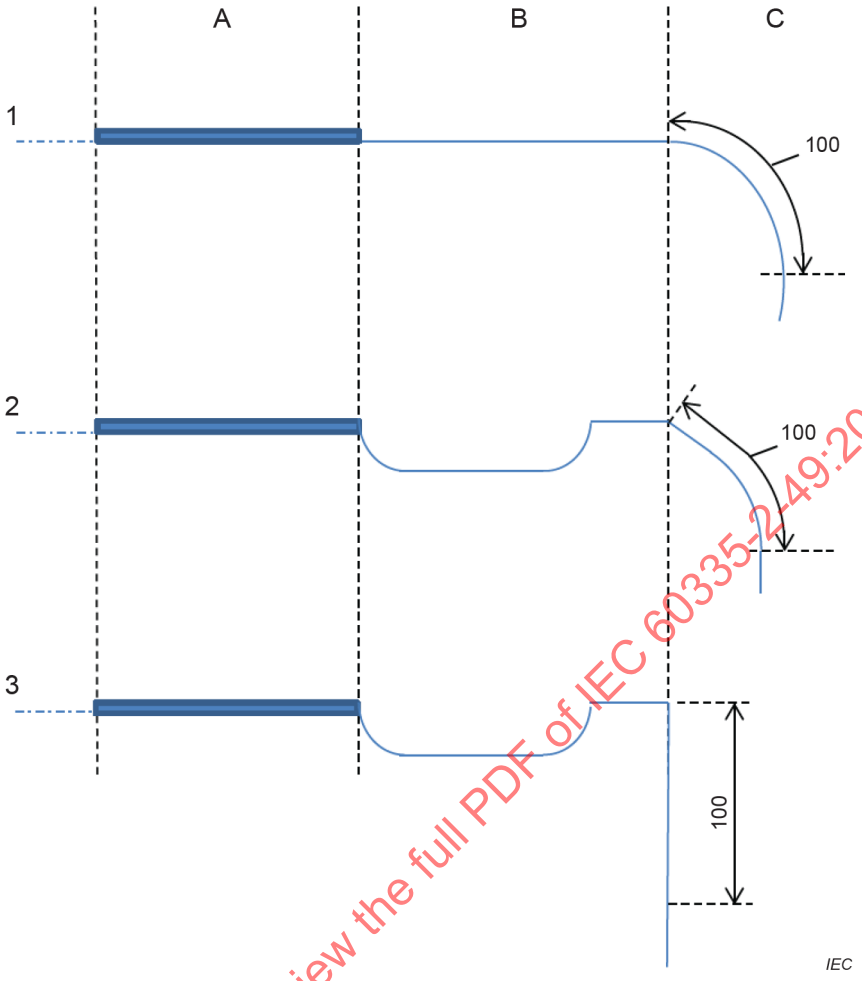
C handle arrangement permitting a contact force of 4 N ± 1 N

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

Dimensions in millimetres



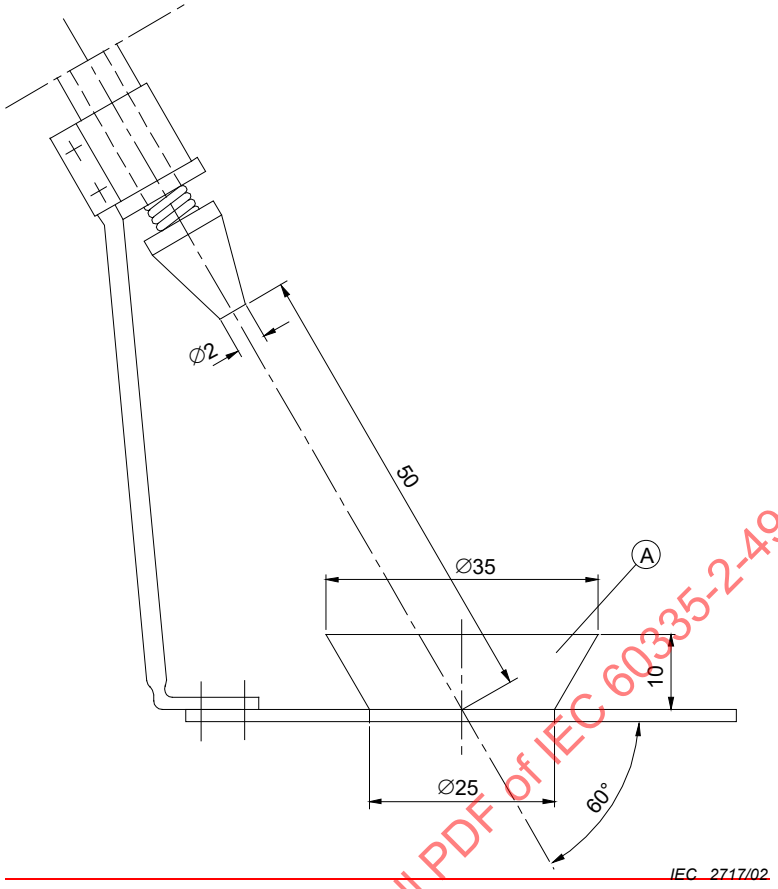
Key

A functional surface

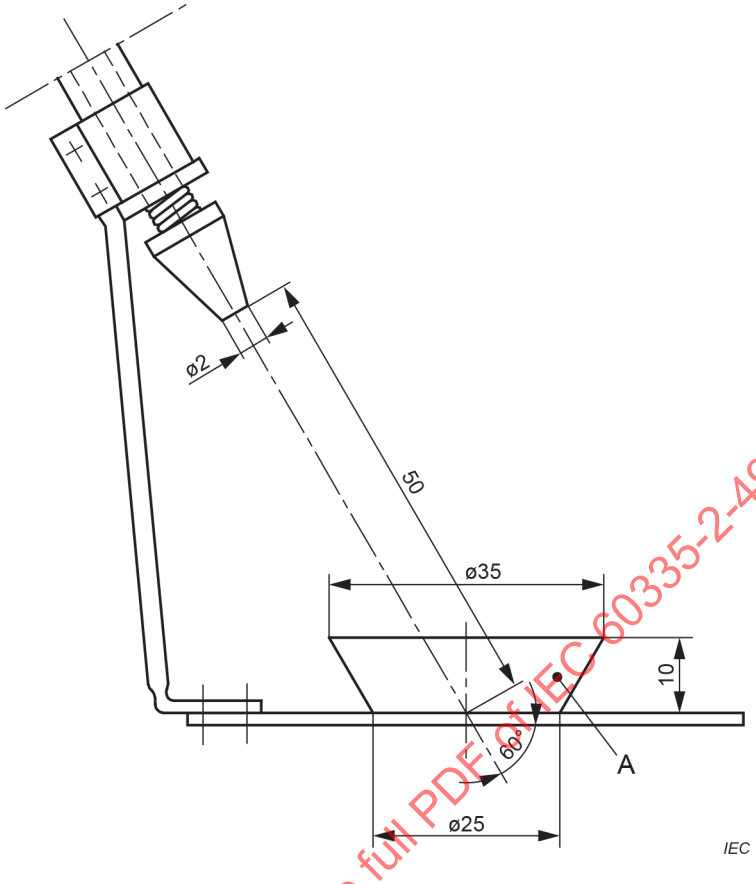
B adjacent surface

C external accessible surface

Figure 102 – Identification of surfaces for temperature measurement



Dimensions in millimetres



Key

A bowl

Figure ~~101~~ 103 – Splash apparatus

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

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

This annex of Part 1 is not applicable.

~~Annex N~~
~~(normative)~~

~~Proof tracking test~~

~~**6.3** *Addition:*~~

~~*Add 250 V to the list of specified voltages.*~~

Annex P
(informative)

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

Annex P of Part 1 is applicable except as follows.

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 except as follows.

Addition:

IEC 60335-2-12, *Household and similar electrical appliances – Safety – Part 2-12: Particular requirements for warming plates and similar appliances*

IEC 60335-2-50, *Household and similar electrical appliances – Safety – Part 2-50: Particular requirements for commercial electric bains-marie*

IEC 60335-2-49

Edition 5.0 2021-11

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Safety – Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

Appareils électrodomestiques et analogues – Sécurité – Partie 2-49: Exigences particulières pour les appareils électriques à usage commercial destinés à maintenir au chaud les aliments et la vaisselle

IEC 60335-2-49:2021-11(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

FOREWORD

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IEC 60335-2-49 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) introduction of requirements for appliances intended for use in areas open to the public, including external accessible surface temperatures (Clause 1, 7.12, 11.8, Table 102);
c) exclusion of battery-operated appliances (Clause 1);
d) clarification of applicable standard for appliances for use by laymen (Clause 1, 7.12);

e) relocation of cleaning instructions from 7.12.1 to 7.12;

f) relocation of 24.101 to 22.106;

g) conciliation of the text of IEC 60335-2-49 with other standards under IEC/TC61/MT32;

h) some notes have been converted to normative text, modified or deleted (Clause 1, 7.1, 7.15, 11.3, 11.7, 15.2, 19.2, 22.101, 23.3);

i) additional requirements for measurement of input current;

j) clarification of the testing procedure in 15.1.1;

k) clarification of the test conditions in 20.1 and 23.3;

l) clarifications of the requirements in 25.3.

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

FDIS	Report on voting
61/6365/FDIS	61/6411/RVD

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

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

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

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

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

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

This Part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial electric appliances for keeping food and crockery warm.

When a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;

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

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

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

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

- reconfirmed,
- withdrawn,
- 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).

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

INTRODUCTION

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

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

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm

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 appliances for keeping food and crockery warm, 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.

Examples of appliances that are within the scope of this standard are:

– **hot cupboards**, with or without **heated tops**;
– **heated tops**;
– **heated display cases**;
– **heated crockery dispensers**;
– **heated tables**;
– **radiant heaters**.

These appliances are not intended for household and similar purposes. They are used for commercial purposes, processing of food, also in **areas open to the public**, for example in kitchens of restaurants, canteens, hospitals and in commercial enterprises, such as bakeries and butcheries.

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.

Attention is drawn to the fact that:

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;
– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities;
– in many countries, additional requirements are specified for pressure appliances.

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;
– commercial electric bains-marie (IEC 60335-2-50);
– **battery-operated appliances**;

– warming plates and similar appliances for household use covered by IEC 60335-2-12 used in the following environments by laymen:
  - staff kitchen areas in shops, offices and other working environments;
  - farm houses;
  - hotels, motels and other residential type environments;
  - bed and breakfast type environments.

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60436, *Electric dishwashers for household use – Methods for measuring the performance*

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, *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:*
operation of the appliance under the following conditions

Appliances are operated empty and with any controls intended to be operated by the user set at the maximum.

If the appliance cannot be operated empty, then the manufacturer's instructions are taken into account.

Doors, covers or lids, if any, are placed in their intended positions.

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

Appliances incorporating **induction heating sources** are operated with the **induction crockery** placed on **induction trays**. All tray supports are loaded, but partial up to full load shall be possible.

All controls are set to maximum, and the **induction crockery** is half-filled with initially cold water. Covers (cloches) are in their position.

The appliances consist of several units, which can form up to three separated modules; they are connected together during operation. These units are the heating module with the **induction heating source**, the rack with the **coil carriers** and the enclosure with the supports for the **induction trays** including the **induction crockery**.

3.5 Definitions relating to types of appliances

3.5.101
hot cupboard
appliance that is used for maintaining the temperature of hot food and for the warming of crockery

3.5.102
heated display case
hot cupboard in which food is displayed, the heated food being served from the display

3.5.103
heated crockery dispenser
appliance designed specifically for the storage, warming and dispensing of plates, etc.

3.5.104
heated table
appliance designed for warm-holding on the surface

3.5.105
radiant heater
stationary appliance for keeping food and crockery warm by means of radiant heat

Note 1 to entry: A part of the appliance can be swivelling.

3.6 Definitions relating to parts of an appliance

3.6.101
heating unit
any part of an appliance that fulfils an independent cooking or heating function

3.6.102
induction heating source
heating source that operates by inducing eddy currents in **induction crockery**

3.6.103
coil carrier
insulation device containing the induction winding

3.6.104
induction crockery
crockery suitable to be heated by induction for heating up or keeping food warm

3.6.105
induction tray
tray adapted to **induction crockery**, as recommended by the manufacturer

3.6.106
functional surface
surface that is intentionally heated by an internal heat source and has to be hot to carry out the function for which the appliance is intended

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

3.6.107
adjacent surface
surface that is adjacent to a **functional surface** and which can become hot through conduction

3.6.108
heated top
top surface of a **hot cupboard**, that is designed to maintain the required temperature.

Note 1 to entry: The **heated top** can be heated indirectly by the **hot cupboard** heating elements or directly by separate heating elements.

3.8 Definitions relating to miscellaneous matters

3.8.101
area open to the public
area in which the general public, including children, can have access

Note 1 to entry: Examples are canteens and self-service restaurants.

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.

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 Appropriate enclosures or additional appliances can be needed for test purposes.

5.101 *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.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

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

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 incorporating **induction heating sources** shall be marked with:

– the operating frequency or operating frequency range, in kilohertz (kHz) of the **induction heating sources**;
– the total power input of all the induction **heating units** that can operate simultaneously, in watts (W) or kilowatts (kW), unless this is indicated in the instructions;
– the total power input of all the non-induction **heating units** that can operate simultaneously, in watts (W) or kilowatts (kW), unless this is indicated in the instructions.

The total power input to be marked or indicated in the instructions is the highest power input that any switch arrangement will allow.

Covers, that if removed, can give direct access to induction coils shall be marked with symbol IEC 60417-5140 (2003-04), or with the substance of the following:

Caution: Magnetic field

If it is not possible to mark the symbol or caution on the cover, it can be placed close to the cover-retaining screws.

If appliances have external **accessible surfaces**, for which temperature rise limits are specified in Table 101 or Table 102 and for which the provisions of footnote b to Table 101 or Table 102 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

 [symbol IEC 60417-5140 (2003-04)] non-ionizing electromagnetic radiation

7.12 *Addition:*

The manufacturer shall declare that the appliance is also intended to be used in an **area open to the public** or, if the appliance is not suitable for use in an **area open to the public,** the instruction shall include the substance of the following warning:

WARNING: This appliance shall not be installed where the public has access.

The instructions of appliances provided with wheels or similar means shall also state the maximum load, in kilograms (kg), of the appliance.

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.

If any of the symbols IEC 60417-5021 (2002-10) or IEC 60417-5041 (2002-10) and IEC 60417-5140 (2003-04) are marked on the appliance, its meaning shall be explained.

The instructions for appliances incorporating **induction heating sources** shall include the substance of the following warning and information:

– WARNING: If the surface of coil carriers changes to darker colour or shows cracks, immediately disconnect the appliance from the supply.
– metallic objects such as kitchen utensils, cutlery, etc., shall not be placed on the induction tray within zones provided for the induction crockery since they could get hot;
– only use induction crockery and induction trays recommended by the manufacturer;
– users with heart pacemakers should consult the manufacturer (unless specific details are given).

The instructions shall also 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 and butcheries, but not for continuous mass production of food.

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

The instructions shall include the substance of the following:

– This appliance is not intended to be used by laymen in household and similar applications such as:
  - staff kitchen areas in shops, offices and other working environments;
  - farm houses;
  - in hotels, motels and other residential type environments;
  - bed and breakfast type environments.

Modification:

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

7.12.1 *Addition:*

The appliance shall be accompanied by instructions detailing any special precautions necessary for installation. For appliances intended for installation in a bank of other appliances and appliances intended to be fixed to an **installation wall,** details of how to ensure appropriate protection against electric shock and harmful ingress of water shall be supplied. If the controls of more than one appliance are combined in a separate enclosure, detailed installation instructions shall be supplied.

For appliances incorporating swivelling **radiant heaters**, the installation instructions shall include detailed information concerning the area of swivelling with regard to the surrounding conditions. Information shall be given on how to limit the swivelling area by the installer.

The operation of appliances incorporating **induction heating sources** requires an increased instruction of the personnel. In addition, the instructions shall state that any repairs shall be carried out only by persons trained or recommended by the manufacturer.

For **class I appliances** that are permanently connected to fixed wiring and for which leakage currents can exceed 10 mA, particularly if disconnected or not used for long periods, or during initial installation, the instruction sheet shall give recommendations regarding the rating of **protective devices**, such as residual current devices (RCD), to be installed.

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 in symbol IEC 60417-5041 (2002-10) shall be at least 15 mm.

The height of symbol IEC 60417-5140 (2003-04) shall be at least 10 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.

For appliances incorporating **induction heating sources** in modular design, the additional label shall be fixed to the heating module (generator).

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**.

7.101 Equipotential bonding terminals shall be marked with symbol IEC 60417-5021 (2005-06).

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 If a swivel **radiant heater** can be swung over adjacent areas or appliances, the instructions for use and installation shall indicate this range. If the temperature rise of the top of the adjacent area or appliance exceeds 65 K during the tests of Clause 11, or 125 K during the tests of Clause 19, the installation instructions provided by the manufacturer shall include the substance of the following warning, that shall also be included on a permanent label attached to the appliance:

WARNING: Where this appliance is to be positioned so that walls, partitions, kitchen furniture, decorative finishes, etc., are in the range of the heat radiated from the adjustable heater, it is recommended that they are made of non-combustible material. If not, they shall be clad with a suitable non-combustible heat-insulating material.

Compliance is checked by inspection.

7.103 Food warming areas of **radiant heaters** adjacent to the appliance shall be permanently marked if the temperature rise during Clause 11 exceeds 65 K. This marking is not required if the swivelling area is between a bank of other appliances.

Compliance is checked by inspection.

7.104 The side of the **radiant heater** case facing the user (front side) shall be permanently marked with symbol IEC 60417-5041 (2002-10).

Compliance is checked by inspection.

7.105 The zones on **induction trays** where the **induction crockery** is to be placed shall be marked permanently, e.g. by an appropriate design.

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 can occur in use.

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

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

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

The tests are carried out three times.

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

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Modification:*

Instead of the first paragraph of the requirement, the following applies:

The power input of appliances without **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than the deviation shown in Table 1.

The power input of appliances having only **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated power input** by more than 10 %.

The measurement is made before the controls are adjusted to the reduced setting.

*For appliances incorporating **induction heating sources** and non-induction heating sources, the following applies:*

*The power input of the **induction heating sources** and the non-induction heating sources is measured separately, in each case using a combination of **heating units** that can be on at the same time to give the highest power input. For the **induction heating sources**, the measurement is made before the controls are adjusted to the reduced setting.*

*For **induction heating sources**, the power input so measured shall not deviate from the **rated power input** marked or declared by the manufacturer (see 7.1) by more than 10 % and in the case of non-induction heating sources deviate from the **rated power input** marked or declared by the manufacturer (see 7.1) by more than the deviation shown in Table 1 for **heating appliances**.*

*In addition, the power input of the appliance when the **induction heating sources** and non-induction heating sources are operated simultaneously shall not deviate from the **rated power input** by more than 10 %.*

Addition:

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

10.2 *Modification:*

Instead of the first paragraph of the requirement, the following applies:

The current of appliances without **induction heating sources**, at **rated voltage** and at normal operating temperature, shall not deviate from the **rated current** by more than the deviation shown in Table 2.

*For appliances incorporating **induction heating sources** and non-induction heating sources, the following applies.*

*The current of the **induction heating sources** and the non-induction heating sources is measured separately, in each case using a combination of **heating units** that can be on at the same time to give the highest current. For the **induction heating sources**, the measurement is made before the controls are adjusted to the reduced setting.*

*For non-induction heating sources, the current so measured shall not deviate from the **rated current** marked or declared by the manufacturer (see 7.1) by more than the deviation shown in Table 2 for **heating appliances**.*

*In addition, the current of the appliance when the **induction heating sources** and non-induction heating sources are operated simultaneously shall not deviate from the **rated current** by more than 10 %.*

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

11 Heating

This clause of Part 1 is applicable except as follows.

11.1 *Addition:*

*For **radiant heaters**, 11.101 applies.*

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:*

*If the magnetic field of an **induction heating source** unduly influences the results, the temperature rises can be determined using platinum resistances with twisted connecting wires or any equivalent means.*

*Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101 and Table 102. 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:*

*The non-induction **heating units** of the appliance are operated under **normal operation** at 1,15 times the power input marked.*

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

*Induction **heating units** are operated simultaneously and supplied separately at the most unfavourable voltage between 0,94 times minimum **rated voltage** and 1,06 times maximum **rated voltage**.*

*If it is not possible to switch on all heating elements or **induction heating sources** 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 unfavourable condition.*

11.7 *Replacement:*

*Appliances incorporating **induction heating sources** are operated at maximum setting of the controls for one cycle, which consists of a heating-up phase and a keeping warm phase.*

*Appliances without **induction heating sources** 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.

11.8 *Modification:*

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

*For appliances intended to be installed in **areas open to the public**, the temperature shall not exceed the values shown in Table 102.*

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;*
- *crockery since it is considered to be a* ***functional surface****;*
- ***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 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.*

Table 102 – Maximum temperature rises of external accessible surfaces for appliances intended to be installed in areas open to the public under normal operating conditions

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

[a] *The following surfaces or elements shall not be taken into consideration:*

- ***functional surfaces****;*
- *handles or control knobs including keypads, keyboards and the like: part of the equipment that a user needs to touch to operate or adjust the equipment. The equipment has to be installed according to the manufacturer's instructions;*
- *surfaces within 5 mm of touch controls regardless of their shape;*
- *surfaces within 25 mm of the outline of the* ***functional surfaces****;*
- *underside surfaces that are not accessible to a 75 mm diameter probe having a hemispherical end;*
- *lids and covers.*

[b] *When the required values are not met, the maximum temperature rise shall not be higher than two times the values indicated, 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 of enamel, powder 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 the coated metal or of glass and ceramic material apply.*

11.101 *For* ***radiant heaters****, the temperature rise limit of 65 K applies to the areas, including walls, which are reached by the radiation. If this temperature rise limit is exceeded, the requirements of 7.102 apply.*

12 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:*

*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, appliances, except those marked IPX5 and IPX6, are subjected for 5 min to the following splash test.

The apparatus shown in 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 the 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 not positioned underneath the appliance.

For all other appliances, 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 to 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 *Modification:*

One litre of the spillage solution is poured steadily over a period of 1 min on to the centre of any heated surface.

***Crockery dispensers** are not tested.*

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.

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:*

A control or switching device that is intended for different settings corresponding to different functions of the same part of the appliance is in addition set in the most unfavourable setting irrespective of the manufacturer's instructions.

Appliances incorporating ***induction heating sources*** *are also subjected to the tests of 19.101 and 19.102.*

For ***radiant heaters****, 19.103 applies.*

19.2 *Addition:*

Fan motors are rendered inoperative.

Doors or lids are open or closed, whichever is the more unfavourable.

Surfaces incorporating heating elements and ***heated tops*** *heated indirectly by the* ***hot cupboard*** *heating elements are covered with a layer of felt having a mass of 4 kg/m^2 ± 0,4 kg/m^2 and a thickness of 25 mm. However, surfaces heated by a radiation source not incorporated in the surface are not covered.*

Detachable reflectors and similar ***detachable parts*** *are placed in any position or removed, whichever is the more unfavourable.*

Appliances incorporating ***induction heating sources*** *are operated fully loaded, with empty* ***induction crockery*** *without covers (cloches) in their position, until steady conditions are established.*

19.3 *Addition:*

Induction heating sources *are supplied with a voltage of 1,06 times the* ***rated voltage****.*

19.13 *Addition:*

The temperature of the windings of the induction coils shall not exceed the values shown in Table 8 of 19.7.

19.101 Appliances incorporating **induction heating sources** shall be constructed so that the risk of fire, mechanical hazard or electric shock is obviated as far as is practicable in the event of incorrect operation or the development of defects in control devices or circuit components.

Compliance is checked by applying any form of operation or any defect in the relevant circuits which may be expected in normal use while the appliance is operated under ***normal operation*** *at* ***rated voltage*** *or at the upper limit of the* ***rated voltage range****. Only one fault condition is reproduced at a time, the tests being made consecutively.*

NOTE Examples of fault conditions are:

– drop-out of contactors and of electromagnetic components;
– failure of motors to start;
– drop in voltage supply, re-appearance of the voltage, voltage interruptions of up to 0,5 s;
– fault conditions specified in 19.11, as applicable.

Examination of the appliance and its circuit diagrams will generally show the fault conditions to be simulated.

19.102 Appliances incorporating **induction heating sources** shall be constructed so that a small piece of metal being situated on a **coil carrier** shall not cause the temperature of the windings of this **coil carrier** to exceed the relevant values specified in Table 8 of 19.7, or shall not lead to a damage of the insulation of this **coil carrier**.

*Compliance is checked by placing a piece of flat mild steel, 2 mm thick and having dimensions 100 mm × 20 mm, in the most unfavourable situation on a **coil carrier**. The appliance is supplied at **rated voltage**, all controls are set to their maximum.*

19.103 *For **radiant heaters**, the limit of 125 K temperature rise applies to the areas, including walls, which are reached by the radiation. If this temperature rise limit is exceeded, the requirements of 7.102 apply.*

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

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

Addition:

Appliances provided with doors, covers or lids, racks and other accessories are tested with doors open or closed, racks partially or fully extended, with or without covers or lids or other accessories, whichever is the more unfavourable.

Appliances provided with wheels or similar means are also subjected to the following test.

***Crockery dispensers** are loaded with dishes so that the load obtained is equal to one-third of the load declared by the manufacturer. The load is placed on the highest usable parts of the appliance. The dishes used are as specified in IEC 60436. If special dishes are specified by the manufacturer, these are used.*

Other appliances are loaded with one-third of the load declared by the manufacturer, placed on the highest usable parts of the appliance.

Appliances provided with doors, covers or lids and other accessories are tested with doors open or closed, with or without covers or lids or other accessories, whichever is the more unfavourable.

The appliance is then placed in the most unfavourable position against an edge with a height equal to the radius of the wheels plus 10 mm. If the wheels differ in size, that edge height that is the most unfavourable is chosen.

A force equal to 8 % of the mass of the fully loaded appliance is applied horizontally to the middle of the top edge of the appliance but not higher than 900 mm, in the most unfavourable direction.

The appliance shall not tilt.

20.2 *Addition:*

Moving parts of motors and fan assemblies of appliances where the fan motor can be operated when the door is open shall be arranged or enclosed so that adequate protection against injury is provided during normal use including cleaning.

It shall not be possible to touch the moving parts of the fan.

Compliance is checked by test probe 41 of IEC 61032 applied with a force of 10 N.

20.101 Guards fitted over motors and fan assemblies in order to comply with the requirements of 20.2 shall not be **detachable parts** unless:

– a suitable interlock assembly is fitted that prevents the motor or fan from operating when the guard is removed;

– the guard forms an integral part of the internal lining.

Compliance is checked by inspection and by manual test.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

The impact test is also applied to the coil carriers.

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 multi-phase appliances, **thermal cut-outs** protecting circuits with heating elements and those for motors of which the unexpected starting can cause a hazard shall be of the non-self-resetting and 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-outs** protecting circuits with heating elements, and those for motors of which the unexpected starting can cause a hazard, shall be of the non-self-resetting and 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 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.

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

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

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, 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 **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.*

22.105 **Induction heating sources** shall have adequate visual or audible warning that the control is in the "ON" position. The position of a control knob does not, in itself, constitute an adequate warning.

Compliance is checked by inspection.

22.106 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:*

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 is subjected to 1 000 flexings at a rate not exceeding 30 per minute.*

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.

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.

25.3 *Addition:*

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 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.

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 103 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 103 – 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.

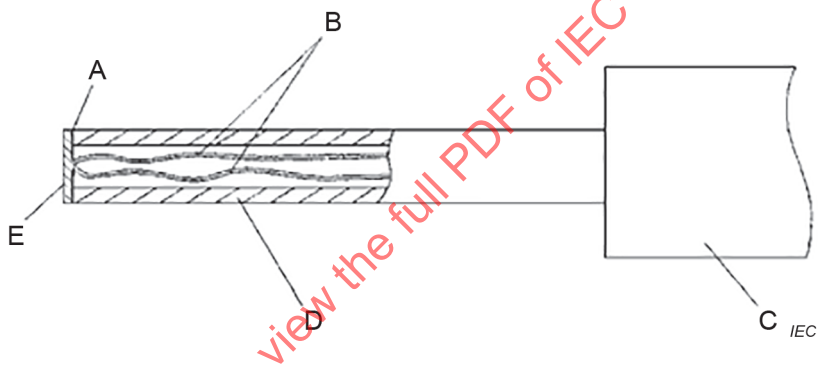
30.2.2 Not applicable.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

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

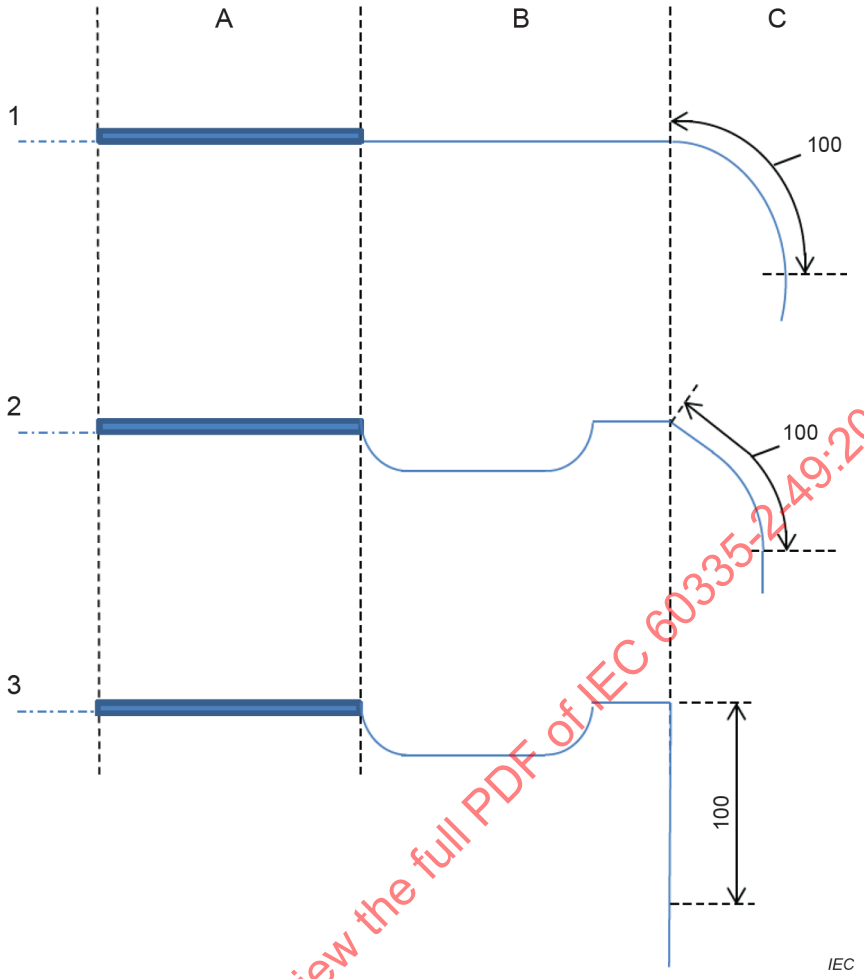
C handle arrangement permitting a contact force of 4 N ± 1 N

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

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

Figure 101 – Probe for measuring surface temperatures

Dimensions in millimetres



Key

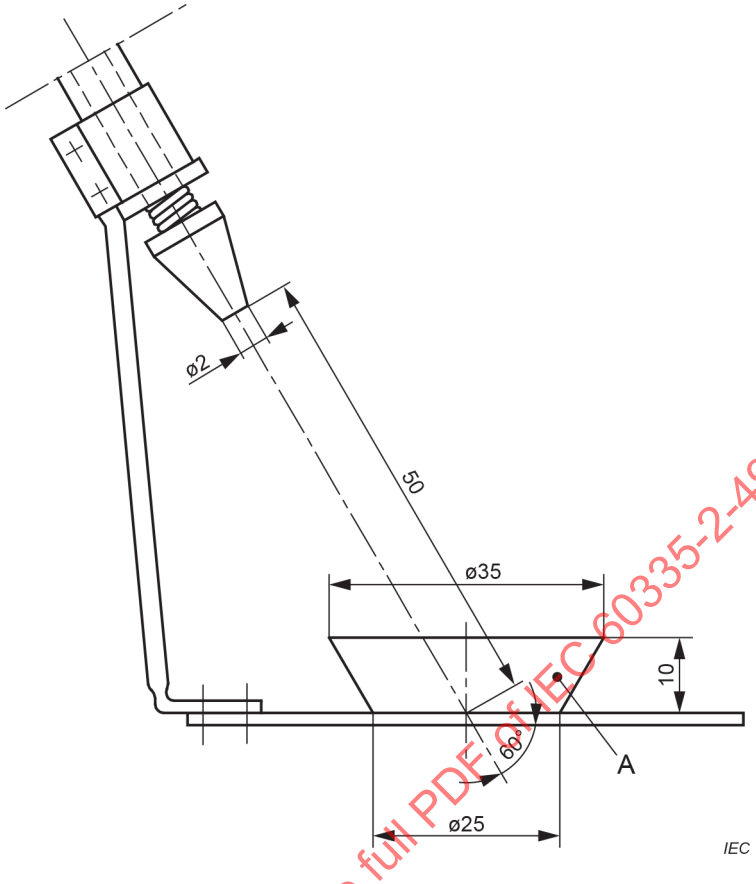
A functional surface

B adjacent surface

C external accessible surface

Figure 102 – Identification of surfaces for temperature measurement

Dimensions in millimetres



Key

A bowl

Figure 103 – Splash apparatus

Annexes

The annexes of Part 1 are applicable except as follows.

Annex B
(normative)

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

This annex of Part 1 is not applicable.

Annex P
(informative)

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

Annex P of Part 1 is applicable except as follows.

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 except as follows.

Addition:

IEC 60335-2-12, *Household and similar electrical appliances – Safety – Part 2-12: Particular requirements for warming plates and similar appliances*

IEC 60335-2-50, *Household and similar electrical appliances – Safety – Part 2-50: Particular requirements for commercial electric bains-marie*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-49: Exigences particulières pour les appareils électriques à usage commercial destinés à maintenir au chaud les aliments et la vaisselle

AVANT-PROPOS

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6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
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8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 60335-2-49 a été établie par le comité d'études 61 de l'IEC: Sécurité des appareils électrodomestiques et analogues. Il s'agit d'une Norme internationale.

Cette cinquième édition annule et remplace la quatrième édition parue en 2002, l'Amendement 1:2008 et l'Amendement 2:2017. Cette édition constitue une révision technique.

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

a) alignement du texte sur l'IEC 60335-1:2020;

b) introduction d'exigences pour les appareils destinés à être utilisés dans des lieux ouverts au public, y compris les températures des surfaces accessibles extérieures (Article 1, 7.12, 11.8, Tableau 102);

c) exclusion des appareils alimentés par batteries (Article 1);

d) clarification de la norme applicable aux appareils destinés à être utilisés par des usagers non avertis (Article 1, 7.12);

e) déplacement des instructions pour le nettoyage du 7.12.1 au 7.12;

f) déplacement du 24.101 au 22.106;

g) alignement du texte de l'IEC 60335-2-49 sur d'autres normes sous l'IEC/TC61/MT32;

h) conversion en texte normatif, modification ou suppression de certaines notes (Article 1, 7.1, 7.15, 11.3, 11.7, 15.2, 19.2, 22.101, 23.3);

i) ajout d'exigences pour le mesurage du courant d'entrée;

j) clarification de la procédure d'essai en 15.1.1;

k) clarification des conditions d'essai en 20.1 et en 23.3;

l) clarification des exigences du 25.3.

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

FDIS	Rapport de vote
61/6365/FDIS	61/6411/RVD

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

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

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

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

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

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

La présente Partie 2 complète ou modifie les articles correspondants de l'IEC 60335-1, de façon à transformer cette publication en norme IEC: Exigences particulières pour les appareils électriques à usage commercial destinés à maintenir au chaud les aliments et la vaisselle.

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

NOTE 2 Le système de numérotation suivant est utilisé:

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

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

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

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

– exigences: caractères romains;

– *modalités d'essais: caractères italiques;*

– notes: petits caractères romains.

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

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

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

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

Le comité recommande que le contenu de cette publication soit entériné au niveau national au plus tôt 12 mois et au plus tard 36 mois après la date de publication.

Les différences suivantes existent dans les pays indiqués ci-après.

– 6.1: les appareils de la classe 01 sont admis (Japon);

– 13.2: les limites de courant de fuite sont différentes (Japon);

IMPORTANT – Le logo "colour inside" qui se trouve sur la page de couverture de ce document indique qu'il contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer ce document en utilisant une imprimante couleur.

INTRODUCTION

Il a été considéré en établissant cette Norme internationale que l'exécution de ses dispositions était confiée à des personnes expérimentées et ayant une qualification appropriée.

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

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

Cette information est donnée à l'intention des utilisateurs de la présente Norme internationale et n'a pas pour objet de remplacer le texte normatif de la présente norme.

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

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

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

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

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

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

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

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

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

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

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

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-49: Exigences particulières pour les appareils électriques à usage commercial destinés à maintenir au chaud les aliments et la vaisselle

1 Domaine d'application

L'article de la Partie 1 est remplacé par l'article ci-après:

La présente Partie de l'IEC 60335 traite de la sécurité des appareils électriques à usage commercial destinés à maintenir au chaud les aliments et la vaisselle, dont la **tension assignée** est inférieure ou égale à 250 V pour les appareils monophasés raccordés entre un conducteur de phase et le conducteur de neutre, et à 480 V pour les autres appareils.

La liste suivante répertorie les exemples d'appareils qui relèvent du domaine d'application de la présente norme:

– les **armoires chauffantes**, avec ou sans **dessus chauffants**;
– les **dessus chauffants**;
– les **comptoirs de distribution chauffants**;
– les **distributeurs de vaisselle chaude**;
– les **tables chauffantes**;
– les **appareils de chauffage rayonnants**.

Ces appareils ne sont pas destinés à un usage domestique ou analogue. Ils sont destinés à un usage commercial pour le traitement des aliments dans des **lieux ouverts au public**, par exemple dans les cuisines de restaurants, les cantines, les hôpitaux et les entreprises commerciales, telles que les boulangeries et les boucheries.

La partie électrique des appareils qui utilisent d'autres formes d'énergie est également comprise dans le domaine d'application de la présente norme.

Dans la mesure du possible, la présente norme traite des dangers courants que présentent ces types d'appareils.

L'attention est attirée sur le fait que:

– pour les appareils destinés à être utilisés dans des véhicules ou à bord de navires ou d'avions, des exigences supplémentaires peuvent être nécessaires;
– dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux de la santé, par les organismes nationaux responsables de la protection des travailleurs, par les organismes nationaux responsables de l'alimentation en eau et par des organismes similaires;
– dans de nombreux pays, des exigences supplémentaires sont spécifiées pour les appareils sous pression.

La présente norme ne s'applique pas:

– aux appareils prévus exclusivement pour des usages industriels;
– aux appareils destinés à être utilisés dans des locaux qui présentent des conditions particulières, telles que la présence d'une atmosphère corrosive ou explosive (poussière, vapeur ou gaz);
– aux appareils conçus pour la production continue en masse d'aliments;
– aux bains-marie électriques à usage commercial (IEC 60335-2-50);
– aux **appareils alimentés par batteries**;
– aux plaques chauffantes et appareils analogues destinés à un usage domestique couverts par l'IEC 60335-2-12 et utilisés par des usagers non avertis dans les environnements suivants:
  - les coins cuisines réservés au personnel des magasins, bureaux et autres environnements professionnels;
  - les fermes;
  - les hôtels, les motels et autres environnements résidentiels;
  - les environnements de type chambres d'hôtes.

2 Références normatives

L'article de la Partie 1 est applicable, avec l'exception suivante.

Addition:

IEC 60436, *Lave-vaisselle électriques à usage domestique – Méthodes de mesure de l'aptitude à la fonction*

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

ISO 898-1, *Caractéristiques mécaniques des éléments de fixation en acier au carbone et en acier allié – Partie 1: Vis, goujons et tiges filetées de classes de qualité spécifiées – Filetages à pas gros et filetages à pas fin*

ISO 3506-1, *Fixations – Caractéristiques mécaniques des fixations en acier inoxydable résistant à la corrosion – Partie 1: Vis, goujons et tiges filetées de grades et classes de qualité spécifiés*

ISO 3506-2, *Fixations – Caractéristiques mécaniques des fixations en acier inoxydable résistant à la corrosion – Partie 2: Ecrous de grades et classes de qualité spécifiés*

ISO 3506-3, *Caractéristiques mécaniques des éléments de fixation en acier inoxydable résistant à la corrosion – Partie 3: Vis sans tête et éléments de fixation similaires non soumis à des contraintes de traction*

ISO 3506-4, *Caractéristiques mécaniques des éléments de fixation en acier inoxydable résistant à la corrosion – Partie 4: Vis à tôle*

3 Termes et définitions

L'article de la Partie 1 est applicable, avec les exceptions suivantes.

3.1 Définitions relatives aux caractéristiques physiques

3.1.4 *Addition:*

Note 101 à l'article: La **puissance assignée** est la somme des puissances de tous les éléments individuels de l'appareil qui peuvent être alimentés simultanément; si plusieurs combinaisons d'éléments sont possibles, celle qui donne la puissance la plus élevée sert à déterminer la **puissance assignée**.

3.1.9 *Remplacement:*
fonctionnement de l'appareil dans les conditions suivantes:

Les appareils sont mis en fonctionnement vides, tous les dispositifs de commande destinés à être manœuvrés par l'usager étant réglés sur le réglage maximal.

Si l'appareil ne peut pas fonctionner vide, les instructions du fabricant sont prises en considération.

Les portes et couvercles éventuels sont placés dans la position prévue.

Les moteurs et les **parties électriques amovibles** incorporés dans l'appareil sont mis en fonctionnement dans les conditions les plus défavorables qui peuvent se produire en usage normal, en tenant compte des instructions du fabricant.

Les appareils qui incorporent des **sources de chauffage à induction** sont mis en fonctionnement en plaçant la **vaisselle à induction** sur les **plateaux à induction**. Tous les supports de plateau sont chargés, mais un chargement partiel ou complet doit être possible.

Tous les dispositifs de commande sont réglés sur le réglage maximal, et la **vaisselle à induction** est remplie à moitié d'eau froide. Les couvercles (cloches) sont en position.

Les appareils sont constitués de plusieurs unités, qui peuvent former jusqu'à trois modules distincts; ils sont reliés ensemble pendant le fonctionnement. Ces unités sont le module chauffant qui incorpore la **source de chauffage à induction**, le tiroir qui comporte les **supports d'inducteur** et l'enceinte qui comporte les supports des **plateaux à induction**, y compris la **vaisselle à induction**.

3.5 Définitions relatives aux types d'appareils

3.5.101
armoire chauffante
appareil dont la fonction est de maintenir la température des aliments ou de chauffer la vaisselle

3.5.102
comptoir de distribution chauffant
armoire chauffante dans laquelle est exposée la nourriture qui est servie chaude à partir de ce comptoir

3.5.103
distributeur de vaisselle chaude
appareil conçu spécifiquement pour le stockage, le chauffage et la distribution d'assiettes, etc.

3.5.104
table chauffante
appareil conçu pour maintenir des éléments au chaud sur la surface

3.5.105
appareil de chauffage rayonnant
appareil fixe dont la fonction est de maintenir au chaud les aliments et la vaisselle par exposition à la chaleur rayonnante

Note 1 à l'article: Une partie de l'appareil peut être pivotante.

3.6 Définitions relatives aux parties d'un appareil

3.6.101
unité chauffante
toute partie d'un appareil qui assure une fonction autonome de cuisson ou de chauffage

3.6.102
source de chauffage à induction
source de chauffage qui fonctionne en induisant des courants de Foucault dans la **vaisselle à induction**

3.6.103
support d'inducteur
dispositif isolant qui renferme l'enroulement d'induction

3.6.104
vaisselle à induction
vaisselle adaptée au chauffage par induction pour le chauffage ou le maintien au chaud des aliments

3.6.105
plateau à induction
plateau adapté à la **vaisselle à induction** recommandée par le fabricant

3.6.106
surface fonctionnelle
surface qui est volontairement chauffée par une source de chaleur interne et qui doit être chaude pour assurer la fonction prévue de l'appareil

Note 1 à l'article: La gaine chauffée d'un élément chauffant tubulaire constitue un exemple.

3.6.107
surface adjacente
surface qui est adjacente à une **surface fonctionnelle** et qui peut devenir chaude par conduction

3.6.108
dessus chauffant
surface supérieure d'une **armoire chauffante** dont la fonction est de maintenir la température exigée

Note 1 à l'article: Le **dessus chauffant** peut être chauffé indirectement par les éléments chauffants de l'**armoire chauffante**, ou directement par des éléments chauffants distincts.

3.8 Définitions relatives à des sujets divers

3.8.101
lieu ouvert au public
lieu qui peut être accessible au grand public, y compris les enfants

Note 1 à l'article: Les cantines et les restaurants en libre-service en sont des exemples.

3.8.102
mur d'installation
construction fixe spéciale qui comporte les dispositifs d'alimentation des appareils qui y sont raccordés

4 Exigences générales

L'article de la Partie 1 est applicable.

5 Conditions générales d'essais

L'article de la Partie 1 est applicable, avec les exceptions suivantes.

5.10 *Addition:*

Les appareils destinés à être installés en batterie avec d'autres appareils et les appareils destinés à être fixés à un ***mur d'installation*** *sont sous une enveloppe de manière à assurer une protection contre les chocs électriques et les effets nuisibles de la pénétration de l'eau équivalente à celle procurée lorsqu'ils sont installés conformément aux instructions fournies avec l'appareil.*

NOTE Des enveloppes adaptées ou des appareils supplémentaires peuvent être nécessaires pour les essais.

5.101 *Les appareils sont soumis à l'essai comme des* ***appareils chauffants*** *lorsque les appareils de chauffage électriques sont sous tension au cours d'un mode de fonctionnement. Si aucun appareil de chauffage électrique n'est sous tension, les appareils sont soumis à l'essai comme des appareils à moteur.*

5.102 *Les appareils, lorsqu'ils sont montés en combinaison avec d'autres appareils ou lorsqu'ils incorporent d'autres appareils, sont soumis à l'essai conformément aux exigences de la présente norme. Les autres appareils sont mis en fonctionnement simultanément conformément aux exigences des normes correspondantes.*

6 Classification

L'article de la Partie 1 est applicable, avec les exceptions suivantes.

6.1 *Remplacement:*

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

La vérification est effectuée par examen et par les essais applicables.

6.2 *Addition:*

Les appareils normalement utilisés sur une table doivent être au moins IPX3. Les autres appareils doivent être au moins IPX4.

7 Marquage et instructions

L'article de la Partie 1 est applicable, avec les exceptions suivantes.

7.1 *Addition:*

Les appareils qui comportent des **sources de chauffage à induction** doivent porter les marquages suivants:

– la fréquence de fonctionnement ou la plage de fréquences de fonctionnement, en kilohertz (kHz), des **sources de chauffage à induction**;
– la puissance totale de l'ensemble des **unités chauffantes** à induction qui peuvent fonctionner simultanément, en watts (W) ou en kilowatts (kW), sauf si celle-ci est indiquée dans les instructions;
– la puissance totale de l'ensemble des **unités chauffantes** qui ne sont pas à induction et qui peuvent fonctionner simultanément, en watts (W) ou en kilowatts (kW), sauf si celle-ci est indiquée dans les instructions.

La puissance totale à marquer ou à indiquer dans les instructions correspond à la puissance la plus élevée admise par le circuit de commutation.

Les couvercles, qui peuvent procurer un accès direct aux bobines d'induction lorsqu'ils sont retirés, doivent porter un marquage sur lequel est apposé le symbole IEC 60417-5140 (2003-04), ou qui comporte en substance l'indication suivante:

Attention: Champ magnétique

S'il n'est pas possible d'apposer ce symbole ou cet avertissement sur le couvercle, celui-ci peut être placé à proximité des vis de fixation du couvercle.

Si un appareil possède des **surfaces accessibles** extérieures, pour lesquelles des limites d'échauffement sont spécifiées dans le Tableau 101 ou le Tableau 102 et pour lesquelles les dispositions de la note de bas de tableau b du Tableau 101 ou du Tableau 102 s'appliquent, l'appareil doit porter un marquage sur lequel est apposé le symbole IEC 60417-5041 (2002-10), ou qui comporte en substance l'indication suivante:

Attention: Surfaces chaudes.

7.6 *Addition:*

	[symbole IEC 60417-5041 (2002-10)]	Attention: surface chaude
	[symbole IEC 60417-5140 (2003-04)]	Rayonnements électromagnétiques non ionisants

7.12 *Addition:*

Le fabricant doit déclarer que l'appareil est également destiné à être utilisé dans un **lieu ouvert au public** ou, si l'appareil n'est pas apte à l'emploi dans un **lieu ouvert au public**, les instructions doivent inclure, en substance, la mise en garde suivante:

ATTENTION: Cet appareil ne doit pas être installé dans des lieux accessibles au public.

Les instructions pour les appareils équipés de roues ou dispositifs analogues doivent également indiquer la charge maximale de l'appareil, en kilogrammes (kg).

Des instructions doivent également être fournies concernant l'**entretien par l'usager**, par exemple pour le nettoyage. Elles doivent inclure une indication qui précise que l'appareil ne doit pas être nettoyé au moyen d'un jet d'eau ou d'un appareil de nettoyage à vapeur.

Si l'un des symboles IEC 60417-5021 (2002-10), IEC 60417-5041 (2002-10) et IEC 60417-5140 (2003-04) est marqué sur l'appareil, sa signification doit être expliquée.

Les instructions des appareils qui comportent des **sources de chauffage à induction** doivent comporter, en substance, la mise en garde et les indications suivantes:

– MISE EN GARDE: Si la surface des supports d'inducteur devient plus sombre ou présente des fissures, déconnecter immédiatement l'appareil de l'alimentation;
– les objets métalliques tels que les ustensiles de cuisine, couverts, etc., ne doivent pas être déposés sur les plateaux à induction dans les zones prévues pour la vaisselle à induction, car ils peuvent devenir chauds;
– utiliser uniquement la vaisselle à induction et les plateaux à induction recommandés par le fabricant;
– il convient que les usagers porteurs de stimulateurs cardiaques contactent le fabricant (sauf si des informations spécifiques sont fournies).

Les instructions doivent également comporter, en substance, l'indication suivante:

Ces appareils sont destinés à un usage commercial, par exemple dans les cuisines de restaurants, les cantines, les hôpitaux et les entreprises commerciales, telles que les boulangeries et les boucheries, mais pas pour la production continue en masse d'aliments.

Si le fabricant souhaite limiter l'utilisation de l'appareil à un domaine plus restreint que celui décrit ci-dessus, cette restriction doit être clairement indiquée dans les instructions.

Les instructions doivent comporter, en substance, les indications suivantes:

– Cet appareil n'est pas destiné à être utilisé par des usagers non avertis dans des applications domestiques et analogues, telles que:
  - les coins cuisines réservés au personnel des magasins, bureaux et autres environnements professionnels;
  - les fermes;
  - les hôtels, les motels et autres environnements résidentiels;
  - les environnements de type chambres d'hôtes.

Modification:

L'instruction concernant les personnes (y compris les enfants) dont les capacités physiques, sensorielles ou mentales sont réduites, les personnes dénuées d'expérience ou de connaissance, et l'utilisation de l'appareil comme jouet par des enfants n'est pas applicable.

7.12.1 *Addition:*

L'appareil doit être accompagné d'instructions qui précisent les précautions spéciales nécessaires à l'installation. Pour les appareils destinés à être installés dans une batterie d'autres appareils, et pour les appareils destinés à être fixés à un **mur d'installation**, des précisions doivent être fournies sur la façon d'assurer une protection appropriée contre les chocs électriques et les effets nuisibles de la pénétration d'eau. Si les dispositifs de commande de plusieurs appareils sont combinés dans un boîtier séparé, des instructions d'installation détaillées doivent être fournies.

Les instructions pour les **appareils de chauffage rayonnants** pivotants doivent comporter des informations précises sur les conditions à respecter autour de la zone de pivotement. Des informations doivent être fournies à l'installateur sur la façon de limiter la zone de pivotement.

Le fonctionnement des appareils qui comportent des **sources de chauffage à induction** exige une instruction accrue du personnel. De plus, les instructions doivent indiquer que toute réparation doit être effectuée uniquement par des personnes formées ou recommandées par le fabricant.

Pour les **appareils de classe I** raccordés de façon permanente à un câblage fixe et dont le courant de fuite peut être supérieur à 10 mA, en particulier s'ils sont déconnectés ou s'ils ne sont pas utilisés pendant de longues périodes, ou lors de la première installation, la notice d'instructions doit contenir des recommandations concernant les caractéristiques assignées des **dispositifs de protection** à installer, tels que les dispositifs à courant différentiel résiduel (DDR).

La vérification est effectuée par examen.

7.12.4 *Addition:*

Lorsque les **appareils à encastrer** comportent un tableau de commande distinct pour plusieurs appareils, les instructions doivent indiquer que le tableau de commande ne doit être connecté qu'aux appareils spécifiés, afin d'éviter tout danger éventuel.

7.12.9 Non applicable.

7.14 *Addition:*

La hauteur du triangle dans le symbole IEC 60417-5041 (2002-10) doit être d'au moins 15 mm.

La hauteur du symbole IEC 60417-5140 (2003-04) doit être d'au moins 10 mm.

7.15 *Addition:*

Lorsqu'il n'est pas possible d'apposer les marquages sur les **appareils installés à poste fixe** de manière à ce qu'ils soient visibles après l'installation, les informations correspondantes doivent également être indiquées dans les instructions d'emploi ou sur une étiquette supplémentaire qui peut être fixée à proximité de l'appareil après l'installation.

Pour les appareils qui comportent des **sources de chauffage à induction** de conception modulaire, l'étiquette complémentaire doit être apposée sur le module de chauffage (générateur).

Le marquage spécifié pour les **surfaces accessibles** extérieures doit être visible lorsque l'appareil est mis en fonctionnement comme en usage normal, y compris lors de l'actionnement d'un interrupteur, du réglage d'un dispositif de commande ou de l'ouverture d'un couvercle ou d'une porte. Il ne doit pas être apposé sur une **surface fonctionnelle** ou une **surface adjacente**.

7.101 Les bornes de liaison équipotentielle doivent être marquées du symbole IEC 60417-5021 (2005-06).

Ces marquages ne doivent pas être placés sur des vis, des rondelles amovibles ou d'autres éléments qui peuvent être enlevés lors du raccordement des conducteurs.

La vérification est effectuée par examen.

7.102 Si un **appareil de chauffage rayonnant** pivotant peut osciller au-dessus de surfaces ou d'appareils adjacents, les instructions d'emploi et d'installation doivent indiquer son rayon d'action. Si l'échauffement de la partie supérieure de la surface adjacente ou de l'appareil adjacent dépasse 65 K au cours des essais de l'Article 11 ou 125 K au cours des essais de l'Article 19, les instructions d'installation fournies par le fabricant doivent comporter en substance la mise en garde suivante, qui doit également figurer sur une étiquette permanente apposée sur l'appareil:

MISE EN GARDE: Lorsque cet appareil doit être positionné de telle sorte que les murs, cloisons, meubles de cuisine, bordures décoratives, etc., se trouvent dans le périmètre de la chaleur rayonnée par l'appareil de chauffage réglable, il est recommandé que ceux-ci soient réalisés dans un matériau non combustible. A défaut, ils doivent être recouverts d'un matériau isolant thermique non combustible adéquat.

La vérification est effectuée par examen.

7.103 Les zones de maintien au chaud des aliments des **appareils de chauffage rayonnants** à proximité de l'appareil doivent porter un marquage permanent si les échauffements dépassent 65 K au cours des essais de l'Article 11. Ce marquage n'est pas exigé si la zone de pivotement se situe entre d'autres appareils en batterie.

La vérification est effectuée par examen.

7.104 Le côté de l'**appareil de chauffage rayonnant** qui fait face à l'usager (face avant) doit porter un marquage permanent sur lequel est apposé le symbole IEC 60417-5041 (2002-10).

La vérification est effectuée par examen.

7.105 Les zones des **plateaux à induction** sur lesquelles doit être placée la **vaisselle à induction** doivent porter un marquage permanent, en utilisant par exemple une sérigraphie appropriée.

La vérification est effectuée par examen.

8 Protection contre l'accès aux parties actives

L'article de la Partie 1 est applicable.

9 Démarrage des appareils à moteur

L'article de la Partie 1 est applicable, avec l'exception suivante.

9.101 Les moteurs des ventilateurs qui assurent une fonction de refroidissement afin de satisfaire aux exigences de l'Article 11 doivent démarrer dans toutes les conditions de tension qui peuvent être rencontrées en cours d'utilisation.

*La vérification est effectuée par les essais suivants en utilisant une source d'alimentation telle qu'il ne se produit pas de chute de tension supérieure à 1 % au cours des essais. L'appareil revient à la **température de la pièce** après chaque essai.*

*L'appareil est démarré dans les conditions qui se produisent au début du fonctionnement normal ou, pour les appareils automatiques, au début du cycle normal de fonctionnement, en appliquant aux bornes d'entrée de l'appareil une tension égale à 0,85 fois la **tension assignée**.*