IEC 60335-2-75

Edition 4.0 2024-12
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Safety –
Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

IEC 60335-2-75:2024-12 CMV(en)

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

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

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC 60335-2-75

Edition 4.0 2024-12
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Safety – Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 55.230

ISBN 978-2-8327-0117-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 60335-2-75:2024 edition 4.0 allows the user to identify the changes made to the previous IEC 60335-2-75:2012 +AMD1:2015+AMD2:2018 CSV edition 3.2. Furthermore, comments from IEC TC 61 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 60335-2-75 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2012, Amendment 1:2015 and Amendment 2:2018. This edition constitutes a technical revision.

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

a) alignment with IEC 60335-1:2020;
b) conversion of some notes to normative text (Clause 1, 7.1, 19.2, 19.101);
c) addition of requirements for electrode-type liquid heaters (Clause 1, 3.1.9, 3.6.101, 3.7.103, 13.2, 13.3, 16.2, 16.3, 19.1, 19.103 to 19.106, 22.6, 22.33, 22.115 to 22.118, 24.1.2, 27.1, Annex BB);
d) addition of test requirements for appliances with a recommended ambient temperature above 25 °C (5.7);
e) application of test probes 18 and 19 (8.1.1, 20.2, 22.101, B.22.3, B.22.4);
f) addition of accessible surface temperature limits including marking of hot surfaces (7.1, 7.6, 7.12, 7.14, 7.15, 11.3, 11.8);
g) addition of requirements to prevent simultaneous operation of multiple loads (22.114, Annex R);
h) clarification of requirements for thermal cut-outs located in a service area (24.103).

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

Draft	Report on voting
61/7301/FDIS	61/7344/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/publications.

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

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

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial dispensing appliances and vending machines.

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

NOTE 2 The following numbering system is used:

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

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

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

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

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

- reconfirmed,
- withdrawn, or
- revised.

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

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

The following differences exist in the countries indicated below.

– 6.1: Class 0I is allowed for appliances used indoors having a rated voltage not exceeding 150 V (Japan).

– 13.2: The leakage current limits are different (Japan).

– 16.2: The 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~~ can differ.

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

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

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

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

NOTE 2 ~~Horizontal and generic standards~~ Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards **1**. ~~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 of measuring performance;
– CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
– CISPR 14-2 concerning electromagnetic immunity;
– IEC standards published by TC 111 concerning environmental matters. **2**

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric commercial **dispensing appliances** and **vending machines** for preparation or delivery of food, drinks and consumer products, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**. 3

~~NOTE 101~~ Examples of appliances that are within the scope of this standard are:

– bulk tea or coffee brewing machines;
– cigarette **vending machines**;
– coffee grinders for use in areas open to the public; 4
– commercial liquid heaters;
– coffee makers with or without integrated coffee grinder;
– coffee makers with cooling systems;
– hot and cold beverage **vending machines**;
– hot water **dispensers**;
– ice cream and whipped cream **dispensers**;
– ice **dispensers**;
– newspaper, audio or video tape or disc **vending machines**;
– packaged food and drink **vending machines**;
– refrigerated merchandisers;
– appliances incorporating **electrode-type liquid heaters**. 5

Appliances can have more than one function.

~~NOTE 102~~ Other standards ~~may~~ can be applicable for some functions such as:

– refrigeration (~~IEC 60335-2-24~~ IEC 60335-2-89);
– heating by microwaves (~~IEC 60335-2-25~~ IEC 60335-2-90);
– professional ice cream makers (IEC 60335-2-118). 6

This standard also deals with the hygiene aspects of appliances.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by users and **maintenance persons**. However, in general, it does not take into account young children playing with the appliance.

~~NOTE 103~~ 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 for appliances incorporating pressure vessels are specified;

– 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.

~~NOTE 104~~ This standard does not apply to:

– appliances intended to be used exclusively for household purposes;

– appliances intended to be used 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);

– commercial coffee grinders for use in areas not open to the public (IEC 60335-2-64); **7**

– commercial electric boiling pans (IEC 60335-2-47);

– commercial electric bains-marie (IEC 60335-2-50);

– amusement machines and personal service machines (IEC 60335-2-82);

– commercial refrigerating appliances (IEC 60335-2-89);

– appliances solely used for dispensing money;

– display cabinets;

~~– appliances incorporating electrode-type water heaters.~~

– requirements for dispensed **potentially hazardous food** (these are covered by national health regulations in many countries).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60287-1-1:2023, *Electric cables – Calculation of the current rating – Part 1-1: Current rating equations (100 % load factor) and calculation of losses – General*

IEC 60320-1:2021, *Appliance couplers for household and similar general purposes – Part 1: General requirements*

IEC 60335-2-34:2021, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*

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

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications*

ISO 1817:~~2015~~2022, *Rubber, vulcanized or thermoplastic – Determination of the effect of liquids*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 ~~*Replacement*~~ *Modification:*
normal operation

Replace the first paragraph with the following: **8**

operation of the appliance under the following conditions:

The appliance is operated in the ~~**standby**~~ **ready mode** until steady conditions are established and then under the most unfavourable dispensing procedure. The appliance is refilled when necessary in accordance with the instructions for use, or the **instructions for maintenance**, and the next operating period is immediately started ~~as soon as possible~~.

Lids and covers of **appliances of the professional type** and of **appliances of the supervised type** are placed in their intended positions.

Coffee makers are operated with their container filled with the **rated capacity** of water, or connected to the water mains, if applicable. Coffee makers with a heated surface intended to keep the liquid warm are operated with or without the container, whichever is the more unfavourable.

For appliances incorporating **electrode-type liquid heaters**, each **electrode-type liquid heater** is supplied from a container filled with water having a conductivity in the conductivity range assigned to the heater by the manufacturer. Unless otherwise specified, the supply containers are filled with water having a conductivity equal to the upper limit of the assigned conductivity range at a temperature of 15 °C ± 5°°C.

Note 1 to entry: The appropriate conductivity can be obtained by adding sodium chloride to the water.

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

3.5 Definitions relating to types of appliances

~~**3.105**~~**3.5.101**
dispensing appliance
appliance intended to deliver or make available food, drinks or other consumer products

Note 1 to entry: The appliance ~~may~~ can also prepare the products.

Note 2 to entry: The dispensing operation ~~may~~ can be initiated manually or by means such as coins or credit cards.

~~**3.106**~~**3.5.102**
vending machine
dispensing appliance that is operated by coins, credit cards or other means of payment

~~**3.112**~~**3.5.103**
appliance of the professional type
dispensing appliance that is only intended to be used by trained personnel such as kitchen or bar staff

~~**3.113**~~**3.5.104**
appliance of the supervised type
dispensing appliance that is intended to be maintained by trained personnel but ~~may~~ can be used by other persons in a location where its use is overseen

Note 1 to entry: Dining rooms in restaurants are examples of such locations.

~~3.115~~3.5.105
espresso coffee maker
coffee maker in which water is heated and forced through the ground coffee by steam pressure or by means of a pump

Note 1 to entry: **Espresso coffee makers** can have an outlet for supplying steam or hot water.

3.6 Definitions relating to parts of an appliance

3.6.2 *Replacement:*
detachable part
part that can be removed without the aid of a **tool**, a part that is removed in accordance with the instructions for use or the **instructions for maintenance**, even if a **tool** or **access key** is ~~needed~~ necessary for removal, or a part that does not fulfil the test of 22.11

Note 1 to entry: If a part has to be removed for installation purposes, this part is not considered to be detachable even if the instructions state that it is to be removed.

Note 2 to entry: A part that can be opened is considered to be a part that can be removed.

3.6.101
electrode-type liquid heater
liquid heater in which a conductive liquid is heated by a current flowing through it

3.6.102
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 or the warming plate of a coffee machine.

3.7 Definitions relating to safety components

3.7.3 *Replacement:*
thermal cut-out
device that during abnormal operation limits the temperature of the controlled part by automatically opening the circuit, or reducing the current, and is constructed so that its setting cannot be altered by the user or the **maintenance person**

~~3.103~~3.7.101
access key
key or other means that gives access to the **maintenance area** but does not give access to the **service area**

Note 1 to entry: "Other means" includes a **tool** or operation by codes or signals produced by optical or electro-magnetic sources.

~~3.104~~3.7.102
override key
key or other means that is used to render an interlock inoperative

3.7.103
isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation of at least equivalent to **double insulation** or **reinforced insulation**, that is intended to supply an appliance or circuit at a voltage higher than **safety extra-low voltage**

3.8 Definitions relating to miscellaneous matters

~~3.102~~3.8.101
~~standby~~ **ready mode** 9
state of the appliance when filled as intended with ingredients or products, energized and ready for use, cash boxes and overflow containers being empty

~~3.107~~3.8.102
instructions for maintenance
instructions explaining how to carry out ~~cleaning, replenishing, coin collecting, setting of controls and similar operations~~ **maintenance operations** in the **maintenance area**

~~3.108~~3.8.103
maintenance person
person who maintains the appliance in accordance with the **instructions for maintenance**

~~3.109~~3.8.104
user area
area where access is gained without the use of an **access key** or a **tool**

Note 1 to entry: The **user area** of **appliances of the supervised type** is determined with **detachable parts** and other movable parts, such as doors and lids, in position as in normal use.

Note 2 to entry: **Appliances of the professional type** have no **user area**.

~~3.110~~3.8.105
maintenance area
area where access can only be gained by the use of an **access key**

~~3.111~~3.8.106
service area
area where access cannot be gained by the use of an **access key** alone

~~3.114~~3.8.107
potentially hazardous food
food which includes natural or synthetic ingredients that are capable of supporting rapid and progressive growth of pathogenic or toxin producing micro-organisms

Note 1 to entry: Examples of **potentially hazardous food** are milk, eggs, meat, poultry, shellfish, crustaceans, and their products, either raw or heat treated, as well as food of plant origin that is ready for consumption without the need for any further preparation or processing.

Note 2 to entry: Food ~~may~~ can become **potentially hazardous food** during processing, for example when powdered ingredients are mixed with water or when food is stored at incorrect temperature.

Note 3 to entry: **Potentially hazardous food** does not include:

– candy, nuts, gum and similar confectionery;
– cookies, crackers and similar bakery products;
– instant-coffee, chocolate, cocoa and sugar;
– food having a pH level of not greater than 4,6 or a water activity (Aw) value not greater than 0,85 at 25 °C;
– food maintained at a temperature not exceeding 5 °C for periods specified by the producer, but for not more than 5 days;
– food maintained at a temperature above 65 °C or below –18 °C;
– food in hermetically sealed containers;
– food that has been processed to prevent spoilage.

~~3.8.5~~3.8.108 ~~*Replacement:*~~
maintenance operation
~~operation performed in the **maintenance area** or **user area**, such as preparing the appliance for new products or new operating methods, cleaning, price changing, replenishing, coin collecting and setting of controls or similar operations~~

any maintenance stated in the **instructions for maintenance**, that the **maintenance person** is intended to perform in the **maintenance area**

Note 1 to entry: **Maintenance operation** does not include operations performed in the **service area**.

Note 2 to entry: Examples of **maintenance operations** are preparing the appliance for new products or new operating methods, cleaning, price changing, replenishing, coin collecting and setting of controls.

Note 3 to entry: **Vending machines** and **dispensing appliances** can have **maintenance areas** that are not accessible to users. The specific maintenance in these areas is to be carried out by the **maintenance person**.

3.8.109
food area
area that comprises surfaces in contact with the food and surfaces that the food can contact during preparation of the product

3.8.110
non-food area
area in the appliance other than a **food area**

3.8.111
splash area
area that comprises surfaces on which part of the food can splash or flow during normal use but so that this food does not become part of the product

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

If the test of 15.102 has to be carried out, three additional samples are required.

If the tests of normative Annex BB are carried out, four additional transformers are necessary.

5.6 ~~*Replacement:*~~

~~*Controls or switching devices in the **user area** are adjusted to the most unfavourable setting.*~~

~~*Controls, switching devices or other parts in the **maintenance area** are adjusted to the most unfavourable setting within limits stated in the **instructions for maintenance**. Controls or switching devices in the **service area** are not adjusted.*~~

Addition:

*Controls, switching devices or other parts in the **maintenance area** are adjusted to the most unfavourable setting within limits stated in the **instructions for maintenance**. Controls or switching devices in the **service area** are not adjusted.* **10**

5.7 *Addition:*

For appliances with a recommended ambient temperature above 25 °C the tests of Clause 10, Clause 11 (except 11.101) and Clause 13 are carried out at the recommended maximum ambient temperature $^{+5}_{-0}$ *°C.* **11**

5.9 *Addition:*

When alternative software is made available by the appliance manufacturer, the appliance is tested with the software that gives the most unfavourable results.

5.10 *Addition:*

NOTE 101 **Access keys** and **override keys** can be supplied separately from the appliance.

Appliances are installed in accordance with the instructions provided with the appliance before testing.

If the instructions state that the appliance may be installed together with other appliances, the effect of this combination is taken into account.

5.101 *Appliances intended to be connected to the water mains are supplied with water having a temperature of 15 °C ± 5 °C and the most unfavourable pressure specified in the instructions. For appliances that are manually filled with water, the temperature of the water is 15 °C ± 5 °C.*

For appliances intended to cool water, the temperature of the water is 25 °C ± 5 °C.

5.102 *The requirements of this standard for the **maintenance area** are applicable when the **instructions for maintenance** are being followed. If an **access key** is provided for access to the **maintenance area**, it is used before a test is carried out if this is more unfavourable.*

~~**5.103** *When reference is made to the application of test probe B, test probe 18 of IEC 61032 is also applied in the **user area**.~~ **12**

~~**5.104**~~**5.103** ***Appliances of the professional type*** *and* ***appliances of the supervised type*** *are tested as* ***heating appliances*** *even if they incorporate a motor. If these appliances do not contain heating elements, they are tested as* ***motor-operated appliances****.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Replace the first paragraph with the following:

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

6.2 *Addition:*

Appliances intended for outdoor use shall be at least IPX4.

Appliances ~~that may~~ intended to be cleaned by water jets or installed where water jets are liable to be used shall be at least IPX5.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances shall be marked with:

– their **rated pressure**, in megapascals, if applicable;
– the maximum permissible water pressure, in megapascals, for appliances intended to be connected to the water mains.

Appliances intended to be filled by hand shall have means, such as a level mark or audible or visual signal, that indicate when the required level for correct operation has been reached.

~~NOTE 101 A level mark or an audible or visual signal are suitable means.~~

~~For appliances incorporating a socket outlet, the voltage, nature of the supply and current or power output shall be marked in the vicinity of the socket outlet.~~ **13**

Appliances intended to be partially immersed in water for cleaning shall be marked with the maximum level of immersion and with the substance of the following:

Do not immerse beyond this level.

If appliances have external **accessible surfaces** for which temperature rise limits are specified in Table 101 and for which the provisions of footnote b to Table 101 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. **14**

7.3 *Addition:*

The requirement also applies when the adjustment has to be made by the **maintenance person**.

7.6 *Addition:*

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

caution, hot surface

7.8 *Addition:*

Terminals for equipotential bonding shall be indicated by symbol IEC 60417-5021 (2002-10).

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

7.12 *Addition:*

The instructions for appliances incorporating **electrode-type liquid heaters** shall state for each heater:

– the liquids intended to be used with the heater;

– the potential consequences of using liquids other than the intended liquids;

– the conductivity range for **normal operation**, expressed by its lower and upper limits in mS/cm. **15**

If symbol IEC 60417-5041 (2002-10) is marked on the appliance, its meaning shall be explained. **16**

7.12.1 *Addition:*

The installation instructions for appliances intended to be connected to the water mains shall specify the means of connection and draw attention to any national rules that ~~may~~ can be applicable.

The installation instructions shall state if the appliance is suitable for outdoor use.

The installation instructions shall state the maximum and minimum ambient temperatures for correct operation.

For appliances that are not at least IPX5, the instructions shall state that the appliance is not suitable for installation in an area where a water jet could be used.

The installation instructions shall state the maximum tilt of the appliance for ~~safe operation~~ normal use. It is not necessary for a tilt of less than 2° ~~need not~~ to be stated. An instruction such as "the appliance has to be placed in a horizontal position" is sufficient.

The installation instructions for **appliances of the professional type** shall state that the appliance is only to be installed in locations where its use and maintenance is restricted to trained personnel.

The installation instructions for **appliances of the supervised type** shall state that the appliance is only to be installed in locations where it can be overseen by trained personnel. The installation instructions for appliances, other than **appliances of the professional type** and **appliances of the supervised type**, shall state that the appliance is intended to be used in an area open to the public. **17**

The installation instructions for **class I appliances of the professional type** that are intended to be permanently connected to fixed wiring and have a leakage current that ~~may~~ can exceed 10 mA shall state that the installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable.

7.12.101 If it is necessary to take special precautions during **maintenance operations**, details of these shall be supplied. The **instructions for maintenance** shall state how to gain access to the **maintenance area** including how to use the **access key** and the **override key**. They shall not include instructions on how to gain access to a **service area**.

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

~~**7.12.101.1**~~ The **instructions for maintenance** shall specify the method and frequency of cleaning. They shall include details for descaling, disinfecting, flushing and removal of any residual cleaners, sterilizers or descalers from the appliance, if applicable. Recommended

cleaning or disinfecting agents shall be specified, and they may be identified by their chemical denomination.

If the appliance is not at least IPX5, the **instructions for maintenance** shall state that the appliance must not be cleaned by a water jet.

The **instructions for maintenance** for appliances incorporating an appliance inlet and intended to be partially or completely immersed in water for cleaning shall state that the connector must be removed before the appliance is cleaned and that the appliance inlet must be dried before the appliance is used again.

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

~~**7.12.101.2**~~ If the use of an **override key** allows access to moving parts, a suitable warning shall be given in the **instructions for maintenance**.

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

~~**7.12.101.3**~~ The **instructions for maintenance** shall list any accessories that may be used with the appliance.

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

~~**7.12.101.4**~~ The **instructions for maintenance** shall state the maximum and minimum ambient temperatures for correct operation.

For appliances using water, the **instructions for maintenance** shall give details concerning the prevention of freezing or ~~how to ensure safe operation~~ what to do if freezing occurs.

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

~~**7.12.101.5**~~ The **instructions for maintenance** for appliances containing pressurized gas shall give details on the ~~safe~~ handling of the pressurized containers and of the gas.

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

~~**7.12.101.6**~~ The **instructions for maintenance** shall specify the types of food for which the appliance is suitable and give details on how to ensure hygienic operation.

Compliance is checked by inspection.

7.12.102 The instructions shall state that access to the **service area** is restricted to persons having knowledge and practical experience of the appliance, in particular as far as safety and hygiene are concerned.

Compliance is checked by inspection.

7.14 *Addition:*

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

7.15 *Addition:*

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

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

*Test probe 18 and test probe 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.* **18**

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Modification:*

Replace the first dashed item of the fourth paragraph with the following: **19**

– *appliances ~~normally~~ intended to be fixed to a floor or table, and those having a mass greater than 40 kg and not provided with casters or rollers, are installed in accordance with the instructions. If no instructions are provided, the appliance is placed on a floor or table as close to the walls as possible~~.~~;*

– *other appliances~~, except **fixed appliances**~~ intended to be placed on a floor or table, are placed on a floor or table as near to the walls as possible;*

11.3 *Addition:*

*Where the external **accessible surfaces** are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external **accessible surfaces** specified in Table 101 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. **20**

11.4 *Addition:*

***Heating appliances** with **electronic circuits** controlling the power input are operated as **combined appliances**.*

*If the temperature rise limits are exceeded in appliances incorporating motors, transformers or **electronic circuits**, and if the power input is lower than the **rated power input**, the test is repeated with the appliance supplied at 1,06 times the **rated voltage**.*

11.6 *Addition:*

***Combined appliances** without electronic power controls are operated as **heating appliances**.*

11.7 ~~*Replacement*~~ *Addition:* **21**

*The appliance is operated under **normal operation** until steady conditions are established, the appliance being refilled when necessary.*

NOTE 101 Refilling can require the use of an **access key**.

11.8 *Addition:*

~~*The temperature rise of the **surfaces** in the **user area** shall not exceed the limits specified for handles, knobs, grips and similar parts that are held for short periods only. This does not apply to the surface of parts that need to be hot in order for the appliance to fulfil its function.*~~

*During the test, the temperature rises of external **accessible surfaces** of **appliances of the professional type** and external **accessible surfaces** in the **maintenance area** of all appliances shall not exceed the values shown in Table 101.*

*The temperature rises of external **accessible surfaces** in the **user area** shall not exceed the values shown in Table 102.* **22**

The temperature rise of handles or grips of vents and air shutters shall not exceed the value specified in Table 3 for surfaces of handles, knobs, grips and similar parts which are held for short periods only in normal use. **23**

*The temperature rise limits of motors, transformers and components of **electronic circuits**, including parts directly influenced by them, may be exceeded when the appliance is operated at 1,15 times the **rated power input**.*

Table 101 – Maximum temperature rises for specified external accessible surfaces of appliances of the professional type and in the maintenance area of all appliances under normal operating conditions

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

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

[a] *Temperature rises are not measured on:*

- *the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the rear surface of appliances which, according to the instructions, shall be placed against a wall and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- ***functional surfaces** and surfaces within 25 mm of the **functional surface**;*
- *hot water supply fittings, hoses, valves and sight gauges;*
- *lids and covers over heated spaces of **heating appliances** and **combined appliances**;*
- *the hot water / vapour / coffee / tea and similar fluids fittings and hoses;*
- *vessels that contain hot liquids and that become hot through conduction by a heated part of the appliance or by contact with the hot liquids (e.g. coffee pots in percolator type coffee makers and kettles).*

[b] *For **heating appliances** and **combined appliances**, the temperature rise on externally **accessible surfaces** 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 powder, 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 for specified external accessible surfaces in the user area 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*

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

[a] *Temperature rises are not measured on:*

- *the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the rear surface of appliances which, according to the instructions, shall be placed against a wall and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- ***functional surfaces** and surfaces within 25 mm of the **functional surface**;*
- *hot water supply fittings, hoses, valves and sight gauges;*
- *lids and covers over heated spaces of **heating appliances** and **combined appliances**;*
- *the hot water / vapour / coffee / tea and similar fluids fittings and hoses;*
- *vessels that contain hot liquids and that become hot through conduction by a heated part of the appliance or by contact with the hot liquids (e.g. coffee pots in percolator type coffee makers and kettles).*

[b] *For **heating appliances** and **combined appliances**, the temperature rise on externally **accessible surfaces** 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 powder 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.*

11.101 *Appliances incorporating refrigerating equipment, and having motor-compressors that do not comply with IEC 60335-2-34:2021 including its normative Annex AA, are also tested at an ambient temperature of*

- *32 °C, for appliances for temperate countries;*
- *43 °C, for appliances for tropical countries.*

Other parts of the appliance are operated to produce the most unfavourable conditions in the refrigerating system.

Temperature rises of parts of the appliance, other than the motor-compressor, are not determined.

The temperature of windings and the enclosure of motor-compressors shall not exceed the following values:

– *140 °C, for windings of motor-compressors with synthetic insulation;*
– *130 °C, for windings of motor-compressors with cellulosic insulation;*
– *150 °C, for external enclosures of motor-compressors.*

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

This clause of Part 1 is applicable. **24**

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

Replace the last two dashed items in the eighth paragraph with the following: **25**

~~*For **stationary class I heating appliances**, the leakage current shall not exceed the following values:*~~

– *for **stationary class I appliances of the professional type** intended to be permanently connected to fixed wiring;*	*1 mA per kW **rated power input** of the appliance, with no maximum;*
– *for other **stationary class I appliances of the professional type***	*1 mA per kW **rated power input** of the appliance, with a maximum of 10 mA;*
– *for other **stationary class I heating appliances***	*0,75 mA or 0,75 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher.*

Addition:

*For appliances incorporating **electrode-type liquid heaters**, the leakage current is additionally measured between any pole of the supply and the equipotential bonding connection of the inflowing and outflowing liquid. If frequencies above 30 kHz are involved, measurement of the leakage current shall include measurement with regard to electric burn effects. For burn effects, the unweighted RMS value of the current is relevant. The unweighted current is calculated from the RMS voltage U1, which is measured across the 500 Ω resistor of IEC 60990:2016, Figure 4. The unweighted current shall not exceed 10 mA.*

*For appliances incorporating **electrode-type liquid heaters** with the equipotential bonding specified in 22.116 connected to the earthing terminal within the appliance or to the earthing contact of the appliance inlet, the current between a metal sieve positioned in the water 10 mm away from the orifice of the appliance liquid outlet and the earthing terminal is measured as shown in Figure 102 for single-phase appliances and in Figure 103 for three-phase appliances. For three-phase appliances with neutral (3N~), the current is measured with the switches a, b and c in the closed position. The measurements are then repeated with each of the switches a, b and c open in turn, the other two switches remaining closed. For three-phase without neutral (3~) connected appliances, the measuring circuit Figure 103 shall be used as applicable, but the neutral is not connected to the appliance. The current shall not exceed 0,25 mA.*

*For appliances incorporating **electrode-type liquid heaters**, the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.* **26**

NOTE 101 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity.

13.3 *Addition:*

*For appliances incorporating **electrode-type liquid heaters**, the test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and **accessible parts**. Instead, the test voltage shall be applied on opposing sides of the insulating material providing insulation according to 22.115 provided that:*

– *it is within the required **creepage distance** of the conductive parts, or*
– *it is within the required **clearance** of the conductive parts.* **27**

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:*

***Appliances of the professional type** classified IPX3 or lower, and intended to be placed on a kitchen floor, are subjected to a test in which water under pressure is indirectly splashed onto the appliance. The splash apparatus is shown in ~~Figure 101~~ Figure 104. The appliance is placed in normal position of use and adjustable feet shall be set in accordance with the instruction for use to the most unfavourable height.* **28**

The bowl is placed on the floor and is moved around in such a way as to splash the appliance from all directions. During the test, the water pressure adjusted so that the water splashes to a height of 150 mm above the bottom of the bowl. The bowl is not positioned underneath the appliance. The apparatus is moved around the appliance in order to splash it from all directions for a total of 5 min.

15.2 *Replacement:*

Appliances subject to spillage of liquids or solids in normal use shall be constructed so that spillage does not affect their electrical insulation. The electrical insulation shall not be affected by cleaning, disinfecting, descaling and similar operations.

Compliance is checked by the tests of 15.2.101 to 15.2.113.

~~*Water used for the tests shall contain approximately 1 % NaCl.*~~

The spillage solution used for the tests shall be comprised of water containing approximately 1 % NaCl and 0,6 % rinsing agent. Any commercially available non-ionic rinsing agent may be used, but if there is any doubt with regard 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 comprise the following substances:*

– *nonionic surfactant (i.e. plurafac ® LF 221[1])* *15,0 % parts by mass*
– *cumene sulfonate (40 % solution)* *11,5 % parts by mass*
– *citric acid (anhydrous)* *3,0 % parts by mass*
– *deionized water* *70,5 % parts by mass* **29**

*Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cord of the smallest cross-sectional area specified in Table 11.*

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

*Before each test, the appliance is operated in the ~~**standby**~~ **ready** **mode**. Containers that are connected to the water mains are prefilled with saline solution.*

*After each overfilling or application of liquid, the appliance shall withstand the electric strength test of 16.3 and inspection shall show that there is no trace of liquid or solids on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29. All residues are then removed and the appliance is dried.*

***Detachable parts** in the **user area** are removed or placed in the most unfavourable position.*

***Detachable parts** in the **maintenance area** are placed ~~in their normal~~ the position according to **instructions for maintenance** following a **maintenance operation**.*

***Detachable parts** of **appliances of the professional type** are placed in their most unfavourable position during normal use.* **30**

15.2.101 *Containers for ingredients or products in powdered or granulated form are filled with dry granulated sugar, ignoring any level indication. A further quantity equal to 15 % of the total capacity of the container is then poured in steadily over a period of 1 min.*

Containers that are intended to be filled outside the appliance are replaced without removing any excess sugar from the outside of the container. Lids are replaced after overfilling.

15.2.102 *Liquid containers that are filled manually are filled with ~~saline~~ the spillage* **31** *solution and a further quantity equal to 15 % of the total capacity of each container or 0,25 l, whichever is the greater, is poured in steadily over a period of 1 min.*

15.2.103 *The outlets of liquid mixing containers are blocked and the containers are filled with ~~saline~~ the spillage* **32** *solution. A further quantity equal to 15 % of the total capacity of each container or 0,25 l, whichever is the greater, is poured in steadily over a period of 15 s. If the container has more than one independent outlet, they are blocked in turn.*

15.2.104 *Drains for liquid waste containers are blocked and the containers are filled with ~~saline~~ the spillage* **33** *solution. A further quantity equal to 15 % of the total capacity of each container or 0,25 l, whichever is the greater, is poured in steadily over a period of 15 s. If the container has more than one independent drain, they are blocked in turn. If there is more than one container, they are tested in turn.*

[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. Equivalent products may be used if they can be shown to lead to the same results.

15.2.105 *Drain taps of containers used during **maintenance operations** are adjusted in turn to the most unfavourable position. The appliance is supplied at **rated voltage** and operated under **normal operation** until the flow of ~~saline~~ the spillage 34 solution stabilizes.*

15.2.106 *Failure of the inlet valve of appliances connected to the water mains is simulated. Water is allowed to flow for 1 min after the first evidence of overflow unless the inflow stops automatically. The failure of only one device is tested at a time.*

15.2.107 *Appliances dispensing liquid into a serving container, such as a cup or jug, are tested by rapidly pouring 0,5 l of ~~saline~~ the spillage 35 solution over the surface where the container is filled, transported and removed by the user.*

15.2.108 *Appliances with accessible openings, including slots for coins or cards, other than **appliances of the professional type** and **appliances of the supervised type**, are tested by slowly pouring 0,25 l of ~~saline~~ the spillage 36 solution into each opening. If the opening is in a vertical surface, the solution is projected towards the opening.*

15.2.109 *Appliances having external surfaces on which it is possible to place a vessel, such as a cup or jug, are tested by rapidly pouring 0,5 l of ~~saline~~ the spillage 37 solution over the surface. The quantity of ~~saline~~ the spillage 38 solution is increased to 5 l for **appliances of the professional type** if their highest surface is lower than 1,5 m. The test is carried out even if the appliance does not dispense liquid. If there is more than one surface, they are tested in turn.*

*For **espresso coffee maker of the professional type**, the amount of ~~water~~ the spillage solution 39 is increased to 5 l only if the highest surface after installation is lower than 1,2 m.*

15.2.110 *Appliances delivering prepacked products are tested to simulate leakage from the package over any area where the package is stored or transported.*

Leakage from liquid products is simulated by rapidly pouring a quantity of ~~saline~~ the spillage 40 solution, equal in volume to the largest prepacked product that can be delivered from the appliance, over the area.

Leakage from dry products is simulated by rapidly pouring a quantity of dry granulated sugar, equal in volume to the largest prepacked product that can be delivered from the appliance, over the area. This test is not applicable to appliances intended to deliver only solid products such as newspapers, films or cigarettes.

15.2.111 **Maintenance operations** *involving the use of liquids are carried out three times.*

15.2.112 *Parts liable to be cleaned are wiped with a sponge, having dimensions approximately 150 mm × 75 mm × 50 mm, saturated with ~~saline~~ the spillage 41 solution. The sponge is applied without appreciable force for approximately 10 s to each surface. This test is not applied to surfaces in the **maintenance area** for which cleaning instructions are given.*

15.2.113 *Appliances subject to descaling are descaled 10 times in accordance with the **instructions for maintenance**. The appliance is then operated in the ~~**standby**~~ **ready mode**.*

15.3 *Addition:*

If it is not possible to place the appliance in the humidity cabinet, electrical parts are tested separately.

15.101 Appliances having a tap that provides water for filling or cleaning shall be constructed so that the water cannot come into contact with **live parts** or affect electrical insulation.

Compliance is checked by the following test.

The appliance is connected to the water mains, the pressure being adjusted to the maximum water pressure marked on the appliance. Tiltable and movable parts, including lids, are placed in the most unfavourable position. The tap is fully opened for 1 min, swivel outlets being adjusted to direct the water in the most unfavourable direction. The appliance shall then withstand the electric strength test of 16.3.

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

Compliance is checked by the following tests, which are carried out on three additional appliances.

*The appliances are operated under **normal operation** at 1,15 times **rated power input**, until the **thermostat** operates for the first time. Appliances without a **thermostat** are operated until steady conditions are established. The appliances are disconnected from the supply, any appliance connector being withdrawn. They are then completely immersed in water containing approximately 1 % NaCl and having a temperature between 10 °C and 25 °C, unless they are marked with the maximum level of immersion, in which case they are immersed 50 mm deeper than this level.*

After 1 h, the appliances are removed from the saline solution, dried and subjected to the leakage current test of 16.2.

This test is carried out four more times, after which the appliances shall withstand the electric strength test of 16.3, the voltage being as specified in Table 4.

*The appliance having the highest leakage current after the fifth immersion is dismantled and inspection shall show that there is no trace of liquid on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

*The remaining two appliances are operated under **normal operation** at 1,15 **times rated power input** for 240 h. After this period, the appliances are disconnected from the supply and immersed again for 1 h. They are then dried and subjected to the electric strength test of 16.3, the voltage being as specified in Table 4.*

*Inspection shall show that there is no trace of liquid on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Modification:*

Replace the last two dashed items in the fourth paragraph with the following: **42**

~~*For **stationary class I heating appliances**, the leakage current shall not exceed the following values:*~~

– *for **stationary class I appliances of the professional type** intended to be permanently connected to fixed wiring*	*2 mA per kW **rated power input** of the appliance, with no maximum;*
– *for other **stationary class I appliances of the professional type***	*2 mA per kW **rated power input** of the appliance, with a maximum of 10 mA;*

– *for other **stationary class I heating appliances***	*0,75 mA or 0,75 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher.*

Addition:

*For appliances incorporating **electrode-type liquid heaters**, the AC test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and **accessible parts**.* **43**

16.3 *Addition:*

*For appliances incorporating **electrode-type liquid heaters**, the test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and **accessible parts**. Instead, the test voltage shall be applied on opposing sides of the insulating material providing insulation according to 22.115 provided that:*

– *it is within the required **creepage distance** of the conductive parts, or*
– *it is within the required **clearance** of the conductive parts.* **44**

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Addition:*

Appliances are also subjected to the tests of 19.101 and 19.102, if applicable.

***Detachable parts** in the **user area** are removed or placed in the most unfavourable position.*

***Detachable parts** in the **maintenance area** are placed in ~~their normal~~ the position according to **instructions for maintenance** following a **maintenance operation**.*

Containers are filled to the most unfavourable level.

Appliances having a control that limits the pressure during the tests of Clause 11 are subjected to the tests of 19.4 with this control rendered inoperative.

*Appliances incorporating **electrode-type liquid heaters** are subjected to the tests of 19.103 to 19.106. Unless otherwise specified, the appliance is operated with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.* **45**

NOTE 101 The appropriate conductivity can be obtained by adding sodium chloride to the water.

NOTE 102 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increasing the conductivity.

19.2 *Addition:*

~~NOTE 101~~ Examples of achieving restricted heat dissipation are

– operating without water;
– switching off the fan;
– covering ventilation openings.

19.4 *Addition:*

If a control also performs other functions, only the part controlling the temperature or pressure is rendered inoperative.

19.11.2 *Modification:*

Replace the penultimate paragraph with the following:

When any of the fault conditions are simulated, the duration of the test is until steady conditions are established.

19.13 *Addition:*

During the tests, molten plastic shall not be emitted.

Liquid having a temperature above 80 °C, steam or solid objects shall not be emitted from ~~unexpected~~ places that are not intended according to instruction and in a way likely to cause injury to persons.

After the tests, compliance with 15.1 and 15.2 shall not be impaired. The electric strength test of 16.3 shall be carried out after each test if it is expected that the electrical insulation could be affected.

19.101 *The appliance is supplied at **rated voltage** and operated under **normal operation**. ~~Any~~ Fault conditions ~~or unexpected operation~~ likely to occur during use of the appliance ~~is~~ are introduced one at a time.*

If operation without water in the appliance is considered to be a more unfavourable condition, the tests are carried out with the water supply valve closed. The water supply valve is not closed during the dispensing operation.

~~NOTE 1~~ *Damaged components or parts can be replaced after each test.*

~~NOTE 2~~ *Examples of fault conditions ~~or unexpected operation~~ are:*

– *defects in the appliance:*
  - *a programmer stopping in any position;*
  - *disconnection and reconnection of one or more phases of the supply mains during any part of the programme;*
  - *open-circuiting or short-circuiting of components;*
  - *locking the main contacts of a contactor in the "on" position if they are used for energizing heating elements. However, this defect is not introduced if at least two independent sets of contacts are provided. This can be achieved by two contactors operating independently of each other or by one contactor having two independent armatures operating two independent sets of main contacts;*
  - *failure of a magnetic valve;*

- *failure of a pneumatic or hydraulic control;*
- *blocking the coin or product channels. If blockage can be noticed from the outside of the appliance, further delivery is not attempted, otherwise the appliance is operated until no further delivery is possible. The wrapping of products in conductive materials has to be taken into account;*

– *faulty operation by users or **maintenance persons**:*

- *incorrect actuation of knobs, handles, switches or push-buttons;*
- *interrupting the dispensing operation by available facilities;*
- *incorrect opening or closing of doors or lids;*
- *~~improper application of the~~ **instructions for maintenance** are not followed;*
- *incorrect routine cleaning. The sponge test of 15.2.112 is applied to all surfaces in the **user area**. It is also applied to all surfaces in the **maintenance area**, except those for which cleaning instructions are given;*
- *setting controls, switches or programmers in the most unfavourable position;*
- *incorrect loading;*
- *incorrect coin collection;*

– *abuse by users:*

- *obstructing dispensing openings;*
- *blocking moving parts.*

~~NOTE 3~~ *In general, tests are limited to the fault conditions that ~~may be expected to~~ give the most unfavourable results.*

19.102 *Appliances incorporating a **thermal cut-out** of the capillary type are tested as specified in 19.4 but with the capillary tube ruptured.*

19.103 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with water having a conductivity equal to the lower limit of the conductivity range assigned to the heater. The appliance is then operated until steady conditions are established. The conductivity of the water in the supply container is then decreased by 10 % and the appliance is operated again until the termination conditions of 19.1 are reached. If steady conditions are established and the continuous voltage across the electrodes increased with respect to the previous operating cycle, the conductivity is again decreased and the test is repeated until the voltage across the electrodes does not increase.*

During the test, the leakage current limits of 13.2 apply. **46**

19.104 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with water having a conductivity equal to the upper limit of the conductivity range assigned to the heater. The appliance is then operated until steady conditions are established. The conductivity of the water in the supply container is then increased by 10 % and the appliance is operated again until the termination conditions of 19.1 are reached. If steady conditions are established, the conductivity is again increased and the test is repeated.*

During the test, the leakage current limits of 13.2 apply. **47**

19.105 *Appliances are operated so that the **electrode-type liquid heater** successfully performs a heating cycle and the heater fills with water. The appliance is then operated for one cycle under conditions of **normal operation** with the water supply of the heater shut off so that no water is supplied to the heater during the operation.* **48**

19.106 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with a saturated water sodium chloride solution.* **49**

NOTE A solution is saturated when no more salt can be dissolved.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

Delete the last two paragraphs. **50**

Addition:

*The appliance is tested with doors, lids and similar parts in the **maintenance area** placed in the ~~normal~~ position of normal use.*

~~*The test with the appliance tilted to 15° is not carried out.*~~

~~*Addition:*~~

*The test is repeated with doors, lids and similar parts in the **maintenance area** placed in the most unfavourable position, however, the appliance is only tilted to an angle of 5°.*

20.2 *Addition:*

*Test probe 18 and test probe 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.* **51**

Covers over moving parts having a kinetic energy exceeding 4 J shall be interlocked so that it is only possible to remove them when the parts are stationary unless they are only removable with the aid of a **tool**.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

~~*The impact energy of 0,5 J is applied in the **maintenance area**.*~~ **52** *In the **user area**, the value of the impact energy is 1,0 J.*

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 *Addition:*

Parts that withstand the aging test of normative Annex AA are not considered to be parts where leakage could occur.

~~Drain holes in coffee makers shall be at least 5 mm in diameter or 20 mm² in area with a width of at least 3 mm.~~

Electrode-type liquid heaters shall be constructed so that any water that could condense on cold surfaces or any liquid that could leak from containers, hoses, couplings and similar parts shall not become a conductive bridge between the equipotential bonding connection of the inflowing and outflowing liquid and the electrodes and circuitry in direct contact with the electrodes. This requirement does not apply to surfaces of the heater that are in contact with liquids during normal use. **53**

For coffee makers, a drain hole that is necessary to comply with the standard shall be at least 5 mm in diameter or 20 mm^2 in area with a width of at least 3 mm. Holes that do not meet these dimensions are considered to be blocked when determining compliance. **54**

Compliance is checked by measurement.

22.7 *Addition:*

Pressure relief devices shall be constructed so that they cannot be rendered inoperative or set to a higher pressure without the aid of a **tool** that is ~~normally~~ only available to the manufacturer.

For appliances incorporating pressurized systems ~~are subjected to~~, compliance is checked by the following test.

All pressure regulating devices are rendered inoperative and the system is filled with water. The pressure is then raised hydraulically until the pressure relief device operates.

*The pressure shall not exceed 1,2 times the **rated pressure** and the appliance shall be fit for further use. The pressure relief device is then rendered inoperative and the pressure again raised until twice the **rated pressure** is attained. The pressure is maintained at this value for 5 min.*

*The system shall not rupture and there shall be no permanent deformation. However, an **intentionally weak part** may rupture after the pressure has attained 1,5 times the **rated pressure** as long as it does not ~~give rise to a hazard~~ impair compliance with this standard. In this case, the weak part is replaced and the test repeated. Rupture shall occur in the same way.*

If fluid cannot circulate freely throughout the pressurized system, separate tests can be carried out on individual parts of the system.

If more than one pressure relief device operates on the same part of the system, they are rendered inoperative together.

This test is not made on refrigerating systems.

The appliance shall then withstand the electric strength test of 16.3.

22.14 *Addition:*

The requirement also applies in the **maintenance area** to parts liable to be touched during **maintenance operations**.

22.33 *Addition:*

Ingredients and products shall not be in direct contact with **live parts** or, for **class II construction**, with **basic insulation**.

This subclause of Part 1 does not apply to **electrode-type liquid heaters**.

22.47 *Addition:*

All pressure regulating devices are rendered inoperative.

22.101 Appliances shall be constructed so that interlocks cannot be rendered inoperative without using an **override key** if they are necessary for compliance with the standard.

Compliance is checked by inspection, by manual test and by applying test probe B of IEC 61032 with a force of 5 N. **55**

For appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, *if the interlock is located in the* **user area**, *test probe 18 of IEC 61032 shall be applied with a force of 2.5 N. If the interlock is situated not more than 850 mm above the floor after installation or in normal use, test probe 19 if IEC 61032 shall also be applied with a force of 2,5 N.* **56**

22.102 It shall not be possible to gain access to the **service area** by only using the **access key** for the **maintenance area**.

Compliance is checked by inspection and by manual test.

22.103 Appliances shall be constructed so that scalding by steam is prevented when a lid is opened.

Compliance is checked by inspection and by the tests of Clause 19.

22.104 Appliances shall be constructed so that dispensed products cannot be contaminated by substances such as lubricants and debris.

Compliance is checked by inspection.

22.105 Appliances shall be constructed so that it is not possible to inadvertently open draw-off taps and drain valves or withdraw drain plugs.

Compliance is checked by inspection and by manual test.

Valves that return automatically to the closed position when released, those of the wheel type or those placed in a recess are considered to comply with this requirement.

22.106 Coin boxes and containers for other payment means shall be positioned or protected so that overfilling ~~cannot cause a hazard~~ does not impair compliance with this standard.

Compliance is checked by inspection.

22.107 Appliances intended to be connected to the water mains shall be constructed for a water pressure not less than 0,6 MPa.

Compliance is checked by inspection.

22.108 Appliances shall be protected in such a manner that moisture, grease and products used in the appliance will not accumulate so that **clearance** and **creepage distances** are ~~affected~~ reduced.

Compliance is checked by inspection.

22.109 Lights indicating a warning against a hazard shall only be coloured red.

Compliance is checked by inspection.

22.110 ~~Appliances having pressurized containers shall be constructed so that the lid cannot be removed while the pressure within the container is excessive. They shall incorporate a means to release the pressure to a value such that the lid can be removed without risk.~~

Appliances having pressurized containers shall be constructed so that the lid cannot be removed until the pressure has been reduced to approximately atmospheric pressure. They shall incorporate a means to release the pressure to a value of approximately atmospheric pressure.

Compliance is checked by the following test.

The appliance is operated as specified in Clause 11 until the pressure regulator operates for the first time.

The appliance is then disconnected from the supply and the pressure allowed to decrease until the pressure is 4 kPa. A force of 100 N is applied to the most unfavourable point where the lid or its handle can be gripped. It shall not be possible to remove the lid.

The internal pressure is then gradually reduced, the force of 100 N being maintained. There shall be no hazardous displacement of the lid when it is released.

This test is not carried out on appliances when the lid is secured by screw clamps or other devices that ensure that the pressure is automatically reduced in a controlled manner before the lid can be removed.

~~**22.111** VOID~~

~~**22.112**~~**22.111** ~~Surfaces of~~ **Food areas** and **splash areas** shall be cleanable so that all unwanted matter can be removed. If necessary, **food areas** shall be capable of being disinfected.

~~The food area comprises surfaces in contact with the food and surfaces that the food may contact during preparation of the product. The splash area comprises surfaces on which part of the food may splash or flow during normal use but this food does not become part of the product.~~ **57**

Compliance is checked by inspection after having operated the appliance as in normal use and then cleaning and disinfecting it in accordance with the ***instructions for maintenance****.*

22.~~**113**~~**112** **Non-food areas** that are not adequately separated from **food areas** of appliances that dispense food shall be constructed so that the retention of moisture or unwanted matter, and the ingress of vermin, is prevented. ~~When this is unavoidable, the surfaces of the non-food areas shall be cleanable in accordance with 22.112.~~

This requirement does not apply to **splash areas** and appliances that dispense food in sealed containers such as cans and bottles.

Compliance is checked by inspection.

22.~~**114**~~**113** An **espresso coffee maker of the professional type** shall be constructed so that it is not possible to remove the coffee filter by a simple operation while ~~there is a hazardous pressure within~~ the container is pressurized. This requirement is considered to be met if the coffee filter can only be removed after it has been rotated through an angle of at least 30°.

Compliance is checked by inspection and by manual test.

22.114 For appliances that are controlled by programmable **electronic circuits** that limit the number of heating elements and motors from being energized at the same time, simultaneous activation of any combination of heating elements and motors shall not render the appliance unsafe.

Compliance is checked as follows:

– *the fault/error conditions specified in Table R.1 are applied and evaluated in accordance with the relevant requirements of normative Annex R; or*

– *the appliance is operated under the conditions of Clause 11 while being supplied at **rated voltage**, the programmable **electronic circuits** being modified to allow simultaneous activation of all heaters and motors under their control. Under these conditions, compliance with 19.13 shall not be impaired.* **58**

22.115 The electrodes of an **electrode-type liquid heater** and any conductive part in direct contact with the electrodes shall be enclosed and separated from the supply mains or any other conductive part by at least **double** or **reinforced insulation** rated for the highest **working voltage** applied to the electrodes or any conductive part in direct contact with the electrodes or **rated voltage**, whichever is higher.

The electrodes shall be supplied by an **isolating transformer** to provide **double insulation** or **reinforced insulation**.

Compliance is checked by inspection and the following test.

It shall not be possible to touch the electrodes and or any conductive part in direct contact with the electrodes with the test probe B and, as applicable, test probe 18 of IEC 61032 in accordance with the conditions specified in 8.1.1 except:

– *the inflowing liquid of the heater before the equipotential bonding specified in 22.116, or*

– *the outflowing liquid of the heater after the equipotential bonding specified in 22.116, or*

– *parts of the equipotential bonding specified in 22.116.* **59**

22.116 For **electrode-type liquid heaters**, the liquid shall enter and leave the heater through metal pipes or flow over metal parts that are permanently and reliably connected with each other to achieve an equipotential bonding connection. If separate metal parts are used, they shall not be located in the liquid inlet or outlet of the appliance.

The contact area between the liquid and the metal pipe or metal part for each contact of the equipotential bond shall be at least 10 times the cross-sectional area of the liquid duct passing through the contact.

The **clearance** between the metal pipe or metal part of each contact of the equipotential bonding and any electrode shall be at least 2 times the value of the largest **creepage distance** between any electrode. The **creepage distance** is measured along the surfaces that are in contact with the liquid during normal use.

Compliance is checked by inspection and the following test.

The low-frequency resistance RLF of the equipotential bond is measured by passing a current between the parts providing the contact to the liquid. The current is derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to 1,5 times the current applied to the electrodes when operated under the most unfavourable setting for normal use. The test is carried out until steady conditions have been established. The voltage drop across the connection is measured and the resistance is calculated from the current and this voltage drop. The resistance shall not exceed 0,1 Ω.

*If frequencies above 30 kHz are involved, the high-frequency resistance RHF is evaluated at the maximum frequency of the **working voltage** applied to the electrodes according to IEC 60287-1-1:2023, 5.1, with RLF as the DC resistance R´ and only considering the skin effect factor y_s of IEC 60287-1-1:2023, 5.1.3. The resistance shall not exceed 0,25 Ω.*

The equipotential bond is then subjected again to a current derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to the current I_{HF} calculated from the formula:

$$I_{HF} = I_{LF}\sqrt{\frac{R_{HF}}{R_{LF}}}$$

where

I_{HF} *is the current to be applied;*

I_{LF} *is the current applied to measure the low-frequency resistance R_{LF};*

R_{LF} *is the low frequency resistance;*

R_{HF} *is the high-frequency resistance.*

The test is carried out until steady conditions have been established. **60**

22.117 Electrode-type liquid heaters shall be constructed so that there is adequate protection against an electric shock when the inflowing and outflowing liquid of the heater is touched simultaneously.

Compliance is checked by the following tests.

The equipotential bonding connection between the inflowing and outflowing liquid is removed before the test is carried out.

*The appliance is operated with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

The current is measured between the metal pipes or metal parts of the equipotential bonding connection between the inflowing and outflowing liquid.

The current is measured between the neutral of the supply mains and:

- *the inlet guard while the outlet guard is connected to the neutral of the supply mains;*
- *the outlet guard while the inlet guard is connected to the neutral of the supply mains.*

For a single-phase appliance, the measuring circuit is shown in Figure 105.

For a three-phase appliance, the measuring circuit is shown in Figure 106.

For three-phase appliances with neutral (3N~) the current is measured with the switches a, b and c in the closed position. The measurements are then repeated with each of the switches a, b and c open in turn, the other two switches remaining closed.

The current is measured by means of the circuit described in IEC 60990:2016, Figure 4. However, if frequencies above 30 kHz are involved, measurement of the current shall include measurement with regard to electric burn effects. For burn effects, the unweighted RMS value

of the current is relevant. The unweighted current is calculated from the RMS voltage U_1, which is measured across the 500 Ω resistor of IEC 60990:2016, Figure 4. The unweighted current shall not exceed 10 mA.

During the test, the current shall not exceed the applicable limits specified in 13.2.

NOTE The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity. **61**

22.118 Electrode-type liquid heaters shall not produce hydrogen gas in hazardous amounts and the construction supporting the electrodes shall be constructed such that gas does not accumulate within the appliance during normal use.

Compliance is checked by inspection and the following test.

*The appliance is operated for one cycle under conditions of **normal operation** with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

*The concentration of hydrogen gas is measured as close as possible to each liquid outlet of the appliance connected to an **electrode-type liquid heater**.*

The concentration of hydrogen gas in the relevant area is measured continuously from the beginning of the test until the end of the cycle. The background hydrogen concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The measured value shall not exceed 50 % of the lower flammability limit (LFL) of hydrogen.

NOTE 1 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity.

NOTE 2 The *LFL* of hydrogen gas is 4 %V/V of air.

The instrument used for monitoring gas concentration, such as those which use infrared sensing techniques, shall have a fast response of not more than 3 s and shall not unduly influence the result of the test.

If gas chromatography is to be used, the gas sampling in confined areas shall occur at a rate not exceeding 2 ml every 30 s.

NOTE 3 Other instruments can be used provided that they do not unduly influence the results. **62**

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 ~~*Modification*~~ *Addition:*

The requirement also applies to **maintenance operations**.

Modification:

Replace the last sentence of the penultimate paragraph with the following: **63**

The number of flexings is

– *200 000, for conductors flexed during normal use;*

– *10 000, for conductors flexed during **maintenance operations**.*

23.101 Anchorages for internal wiring that can easily be replaced shall be constructed and located so that

– the wiring cannot touch the clamping screws of the anchorage if these screws are accessible, unless they are separated from **accessible metal parts** by **supplementary insulation**;

– the wiring is not clamped by a metal screw that bears directly on the wiring;

– for **class I appliances**, the anchorages are of insulating material or are provided with an insulating lining, unless failure of the insulation of the wiring does not make **accessible metal parts** live;

– for **class II appliances**, the anchorages are of insulating material, or if of metal, they are insulated from **accessible metal parts** by **supplementary insulation**.

Compliance is checked by inspection.

23.102 Internal wiring that is accessible in the **maintenance area** and is moved during **normal operation** shall comply with 25.13, 25.14, 25.15 and 25.21.

Compliance is checked by the relevant tests.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.2 *Addition:*

*The relevant standard for **isolating transformers** is IEC 61558-2-4. If they have to be tested, they are tested in accordance with normative Annex BB.* **64**

24.1.5 *Addition:*

*For appliance couplers incorporating **thermostats**, **thermal cut-outs** or fuses in the connector, IEC 60320-1:2021 is applicable except that*

– *the earthing contact of the connector is allowed to be accessible, provided that this contact ~~is not likely to~~ cannot be gripped during insertion or withdrawal of the connector;*

– *the temperature required for the test of Clause 18 is that measured on the pins of the appliance inlet during the heating test of Clause 11 of this standard;*

– *the breaking-capacity test of Clause 19 is carried out using the inlet of the appliance;*

– *the temperature rise of current-carrying parts specified in Clause 21 is not determined.*

Thermal controls are not allowed in connectors complying with the standard sheets of ~~IEC 60320-1~~ IEC 60320-3.

24.2 ~~*Modification*~~ *Addition:*

Switches and automatic controls operating at **safety extra-low voltage** may be fitted in **interconnection cords** in the **maintenance area**.

24.101 Connecting devices of **interconnection cords** shall be identified if they are interchangeable with other connecting means in the appliance~~, if this could result in a hazard~~ and connection to the wrong connecting means could impair compliance with the standard.

NOTE Colour coding can be used for identification.

Compliance is checked by inspection.

24.102 Interlock switches shall comply with IEC 61058-1 as far as is reasonable and shall ensure **all-pole disconnection**. However, single-pole disconnection is allowed for protection against risk of mechanical ~~hazards~~ injury.

Compliance is checked by testing the switch in accordance with the relevant clauses of IEC 61058-1:2016, the number of cycles of operation for the test of Clause 17 being 10 000. However, if the switch is operated once per delivery, the number of cycles of operation is 100 000. This requirement only applies to interlock switches necessary for compliance with this standard.

24.103 **Thermal cut-outs** incorporated for compliance with Clause 19 shall not be **self-resetting thermal cut-outs**. ~~They shall have a trip-free mechanism if they disconnect heating elements and if they disconnect motors, the unexpected starting of which may cause a hazard to the user or **maintenance person**.~~

Thermal cut-outs shall

– have a trip-free mechanism if they disconnect heating elements and if they disconnect motors, the unexpected starting of which can cause a risk of mechanical injury to the user or **maintenance person**; or

– be located in a **service area**. **65**

Compliance is checked by inspection and by manual test.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable as follows.

25.7 *Addition:*

Supply cords of appliances intended for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

25.15 *Addition:*

When the test is carried out on internal wiring, the pull force is 30 N and the torque 0,1 Nm, irrespective of the mass of the appliance.

For internal wiring, a push force of 30 N is applied when pushing the wiring into the appliance.

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.

27.1 *Addition:*

For **electrode-type liquid heaters**, the electrodes and the circuitry in direct contact with the electrodes shall not be earthed. This requirement does not apply to parts of the equipotential bonding connection between the inflowing and outflowing liquid specified in 22.116. **66**

27.2 *Addition:*

Stationary class I appliances of the professional type intended to be installed in kitchens shall incorporate a terminal for the connection of an external equipotential bonding conductor. This terminal shall be connected to all **accessible metal parts** of the appliance and shall allow the connection of a conductor having a nominal cross-sectional area of 2,5 mm^2 to 10 mm^2. It shall be located so that the conductor can be connected after installation of the appliance. This requirement does not apply to small fixed exposed metal parts such as nameplates and similar parts.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.1 *Addition:*

The requirement also applies to screws that ~~may be~~ are removed during **maintenance operations**.

*The test also applies to screws ~~likely to be~~ that are tightened during **maintenance operations**.*

28.3 *Addition:*

The requirement also applies to screws operated by the **maintenance person**.

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 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance due to

– condensation produced by the appliance;
– the use of liquids and solids, such as ingredients, products or cleaning agents.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

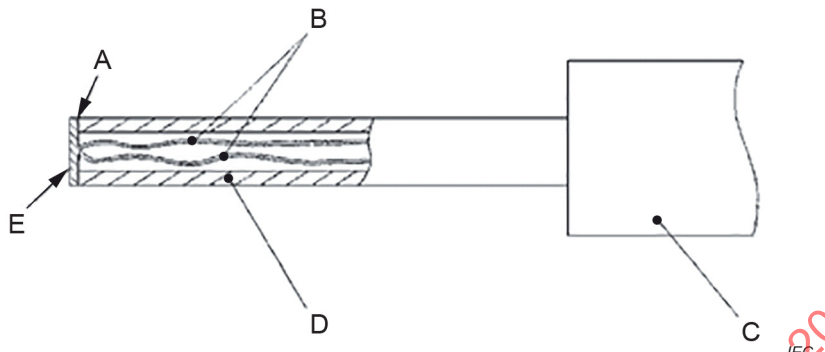
30.2.2 Not applicable.

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

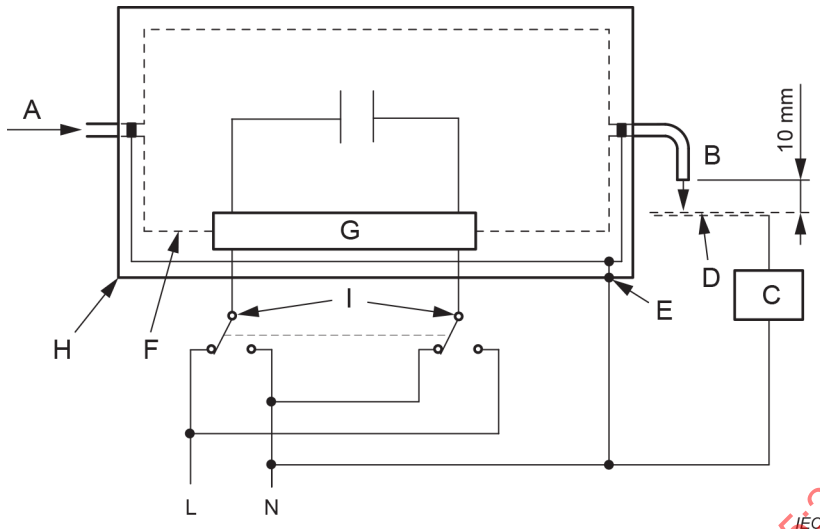
B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

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 a flat contact face

Figure 101 – Probe for measuring surface temperatures



Key

A liquid inlet and associated tube

B liquid outlet and associated tube

C circuit of IEC 60990:2016, Figure 4

D metal sieve

E earthing terminal

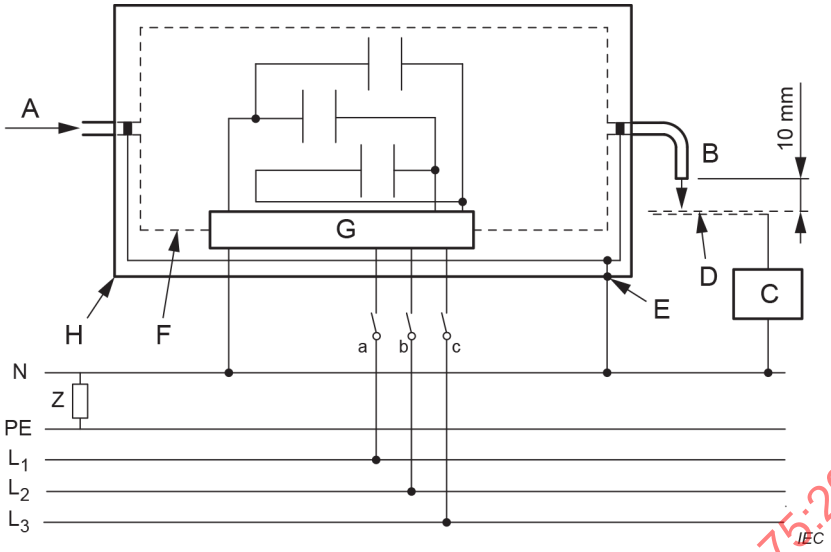
F body of the **electrode-type liquid heater**

G separation means

H body of the appliance

I selector switch

Figure 102 – Circuit diagram for leakage current at operating temperature for single-phase electrode-type liquid heater with the equipotential bond connected to earth



Key

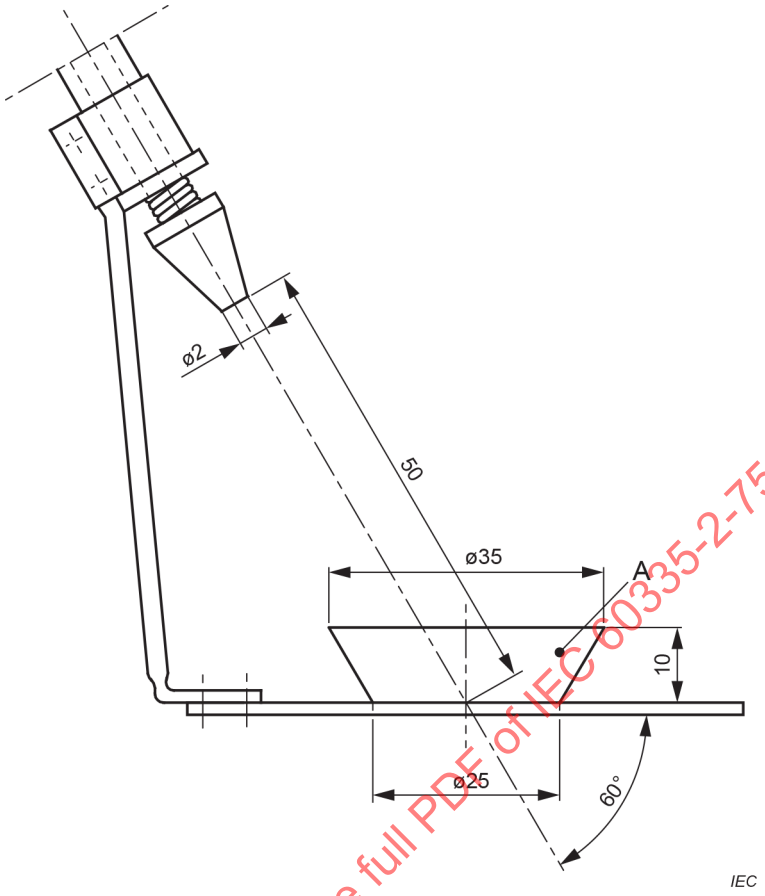
A	liquid inlet and associated tube
B	liquid outlet and associated tube
C	circuit of 60990:2016, Figure 4
D	metal sieve
E	earthing terminal
F	body of the **electrode-type liquid heater**
G	separation means
H	body of the appliance

Connections and supplies

L_1, L_2, L_3, N	supply voltage with neutral
PE	protective earth conductor
Z	IT system neutral to earth high impedance

Figure 103 – Circuit diagram for leakage current at operating temperature for three-phase electrode-type liquid heater with the equipotential bond connected to earth

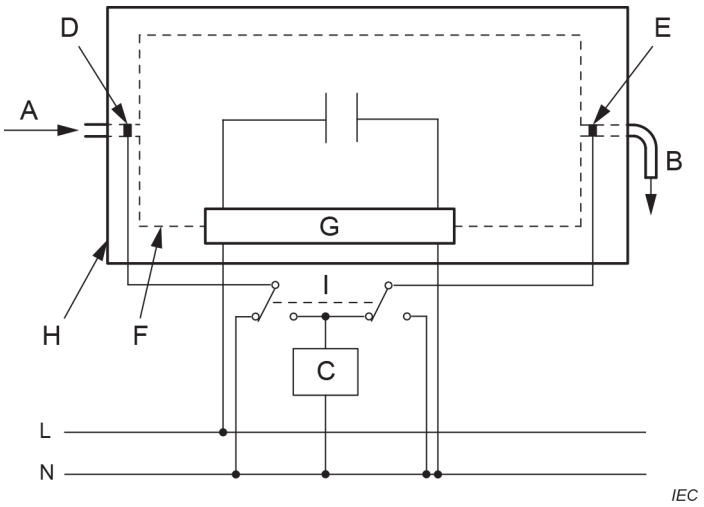
Dimensions in millimetres



Key

A bowl

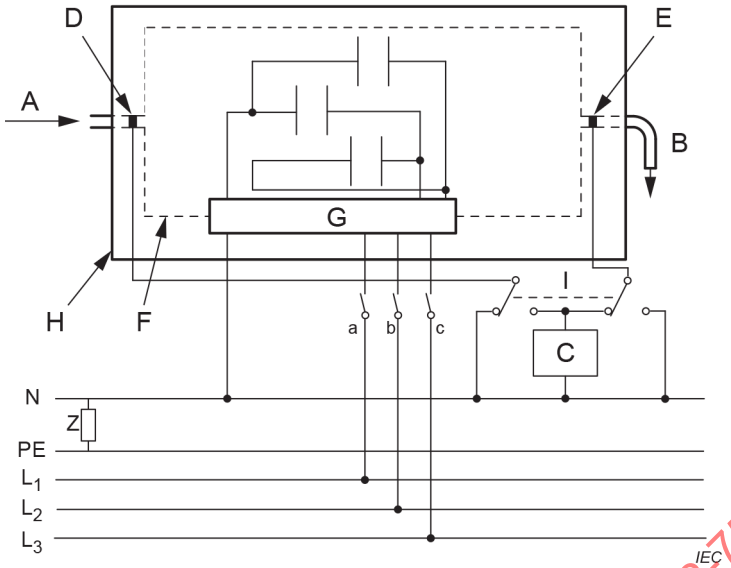
Figure ~~101~~ 104 – Splash apparatus



Key

A liquid inlet and associated tube
B liquid outlet and associated tube
C circuit of IEC 60990:2016, Figure 4
D inlet guard
E outlet guard
F body of the **electrode-type liquid heater**
G separation means
H body of the appliance
I selector switch

Figure 105 – Circuit diagram for single-phase electrode-type liquid heater in 22.117



Key

A	liquid inlet and associated tube
B	liquid outlet and associated tube
C	circuit of IEC 60990:2016, Figure 4
D	inlet guard
E	outlet guard
F	body of the **electrode-type liquid heater**
G	separation means
H	body of the appliance
I	selector switch

Connections and supplies

L_1, L_2, L_3, N	supply voltage with neutral
PE	protective earth conductor
Z	IT system neutral to earth high impedance

Figure 106 – Circuit diagram for three-phase electrode-type liquid heater in 22.117

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

Annex B of Part 1 is applicable except as follows:

B.22.3 *Addition:*

*Test probe 18 and test proble 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.* **67**

B.22.4 *Addition:*

*Test probe 18 and test proble 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.* **68**

Annex R
(normative)

Software evaluation

Annex R of Part 1 is applicable except as follows:

R.2.2.5 *Modification:*

Replace the first paragraph with the following:

For programmable **electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1, detection or a fault/error shall occur before compliance with Clause 19 or 22.114 is impaired.

R.2.2.9 *Modification:*

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

The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19 or 22.114 is impaired. **69**

Annex AA
(normative)

Aging test for elastomeric parts

The aging test on elastomeric parts is carried out by measuring their hardness and mass before and after immersion in water at elevated temperature.

The test is carried out on at least three samples of each part. The samples and test procedure are as specified in ISO 1817:2022 with the following modifications.

~~5~~6 Test liquids

The test is carried out with water.

Care is taken to ensure that the total mass of the test pieces immersed does not exceed 100 g for each litre of water, that the test pieces are completely immersed and that their entire surface is freely exposed to the water. During the tests, the test pieces are not exposed to direct light. Test pieces of different compounds are not immersed at the same time in the same solution.

~~6~~7 Test pieces

~~6~~7.4 Conditioning

The temperature is 23 °C ± 2 °C and the relative humidity is (50 ± 5) %.

~~7~~8 Immersion in the test liquid

~~7~~8.1 Temperature

The water is heated within 1 h with the test pieces immersed, to a temperature of 75 $^{+5}_{0}$ °C and maintained at this value. Water at the same temperature is added to compensate for evaporation.

~~7~~8.2 Duration

The test pieces are immersed for a total period of 48 $^{+1}_{0}$ h.

The test pieces are then immediately immersed in fresh water that is maintained at ambient temperature. The pieces are immersed for 45 min ± 15 min.

After removal from the water, the test pieces are dried with blotting paper.

~~8~~9 Procedure

~~8.2~~9.3 Change in mass

The increase in mass of the test pieces shall not exceed 10 % of the value determined before immersion.

~~8.6~~9.7 Change in hardness

The micro-test for hardness applies.

The hardness of the test pieces shall not have changed by more than 8 IRHD. Their surface shall not have become sticky and shall show no crack visible to the naked eye or any other deterioration.

Annex BB
(normative)

Isolating transformers

The following modifications to this standard are applicable for **isolating transformers**.

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified.

7 Marking and instructions

7.1 Transformers for specific use shall be marked with the:

– name, trademark or identification mark of the manufacturer or responsible vendor;

– model or type reference.

NOTE The definition of transformers for specific use is given in IEC 61558-1:2017.

17 Overload protection of transformers and associated circuits

Fail-safe transformers shall comply with IEC 61558-1:2017, 15.5.

NOTE This test is carried out on three transformers.

22 Construction

IEC 61558-1:2017, 19.1.4.1 and 19.1.4.3 are applicable.

29 Clearances, creepage distances and solid insulation

Instead of 29.1 to 29.3, compliance is checked by the following:

The distances specified in IEC 61558-1:2017, Table 20, Table 21 and Table 22 apply.

*For insulated winding wires complying with IEC 61558-1:2017, 19.12.3, there are no requirements for **clearances** or **creepage distances**. In addition, for windings providing **reinforced insulation**, the distances specified in IEC 61558-1:2017, Table 20 and Table 21 are not assessed.*

*For **isolating transformers** subjected to periodic voltages with frequency exceeding 30 kHz, the **clearances**, **creepage distances** and **solid insulation** values specified in IEC 60664-4:2005 are applicable, if these values are greater than the values specified in IEC 61558-1:2017, Table 20, Table 21 and Table 22.* **70**

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

~~IEC 60335-2-24, *Household and similar electrical appliances – Safety – Part 2-24: Particular requirements for refrigerating appliances, ice-cream appliances and ice-makers*~~

~~IEC 60335-2-25, *Household and similar electrical appliances – Safety – Part 2-25: Particular requirements for microwave ovens, including combination microwave ovens*~~

IEC 60335-2-47, *Household and similar electrical appliances – Safety – Part 2-47: Particular requirements for commercial electric boiling pans*

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

IEC 60335-2-82, *Household and similar electrical appliances – Safety – Part 2-82: Particular requirements for amusement machines and personal service machines*

IEC 60335-2-89, *Household and similar electrical appliances – Safety – Part 2-89: Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor*

IEC 60335-2-90, *Household and similar electrical appliances – Safety – Part 2-90: Particular requirements for commercial microwave ovens*

IEC 60335-2-118, *Household and similar electrical appliances – Safety – Part 2-118: Particular requirements for professional ice-cream makers*

List of comments

1 This revision is for alignment with IEC 60335-1:2020.

2 This revision is for alignment with IEC 60335-1:2020.

3 This revision is for alignment with IEC 60335-1:2020.

4 This adds clarification between those commercial coffee grinders covered by IEC 60335-2-64 and those covered by this Standard.

5 Requirements for electrode-type liquid heaters are added to this Standard.

6 The referenced Standards are updated to refer to the commercial use appliance Standards instead of the household use appliance Standards and the ice cream maker Standard is added.

7 This adds clarification between those commercial coffee grinders covered by IEC 60335-2-64 and those covered by this Standard.

8 This revision maintains the normal operation while charging as specified in IEC 60335-1:2020.

9 Standby mode was changed to ready mode to avoid confusion with “stand-by mode” used in Subclauses 19.11, 19.11.4 and 19.13 of IEC 60335-1:2020.

10 This is changed from a Replacement to an Addition. Control or switching devices in the service area are not taken into consideration because these settings are not accessible by the user or maintenance person, but only by qualified technicians.

11 Appliances recommended for use at ambient temperatures above 25 °C are tested at the higher ambient temperature to verify suitability of the appliance for use at that temperature.

12 This is relocated to Subclauses 8.1.1, 20.2, B.22.3 and B.22.4.

13 This is removed because requirements for appliances with accessible appliance outlets and socket outlets is covered by IEC 60335-1:2020.

14 Functional and adjacent surfaces of heating appliances are known to be hot due to the intended function of the appliance. Identification of other hot surfaces is required when the temperatures in Table 101 or Table 102 are exceeded as noted in footnote b.

15 The specified conductivity range is necessary for compliance testing under the conditions of normal operation.

16 It is common practice to explain the meaning of symbols in the instructions.

17 Appliances of the profession type are not suitable for use by laypersons and appliances of the supervised type require supervision while appliances are used by laypersons. Therefore, this instruction is added to identify other appliances that are suitable for installation in areas open to the public.

18 Appliance installed in areas open to the public can be located on the floor or where they would be accessible to children up to 3 years in age, so test probe 19 is applicable. However, appliances and parts of appliances located above 850 mm from the floor are not considered to be within reach of these children, so test probe 19 is not applied.

19 The content to be modified from the Part 1 Standard is specified.

20 Limits on the temperature rise of external accessible surfaces are introduced to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.

21 This revision maintains the requirements for appliance outlets and socket outlets and the test duration for charging of battery-operated appliances as specified in IEC 60335-1:2020.

22 Limits on the temperature rise of external accessible surfaces are introduced in Table 101 and Table 102 to address the risk of thermal injury from contact with external accessible surfaces based on IEC Guide 117 for Temperatures of touchable hot surfaces.

23 This addition clarifies that these parts are considered to be held for short periods only.

24 This revision is for alignment with IEC 60335-1:2020.

25 This is a clarification of what is being modified from the Part 1 Standard.

26 Additional touch current testing is necessary for electrode-type heating appliances to verify that contact with the inflowing or outflowing liquid during normal use or accessible conductive parts in contact with the liquid does not result in excessive leakage current.

27 Clarification is added for the application of the test voltage for electrode-type heating appliances, so that the insulating material is tested directly.

28 Requirements are added to address moisture resistance testing for appliances with adjustable feet to test in the most unfavourable position.

29 This revision is for alignment with IEC 60335-1:2020.

30 Requirements are added to clarify the placement of detachable parts of appliances of the professional type.

31 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

32 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

33 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

34 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

35 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

36 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

37 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

38 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

39 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

40 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

41 This revision is for alignment with Subclause 15.2 of IEC 60335-1:2020.

42 This is a clarification of what is being modified from the Part 1 Standard.

43 The test voltage is not applied between the electrodes and accessible parts for electrode-type heating appliances because all these parts are on the insulated side of the isolating transformer as specified by Subclause 22.115.

44 Clarification is added for the application of the test voltage for electrode-type heating appliances, so that the insulating material is tested directly.

45 Additional abnormal operating conditions are specified for electrode-type heating appliances.

46 This abnormal operating condition is introduced to verify that operation with a liquid conductivity below the specified range in the instructions does not result in excessive leakage current.

47 This abnormal operating condition is introduced to verify that operation with a liquid conductivity above the specified range in the instructions does not result in excessive leakage current.

48 This abnormal operating condition is introduced to verify that a failure of the water supply to an electrode-type heating appliance does not result in a hazard.

49 This abnormal operating condition is introduced to represent filling the appliance with a liquid with high conductivity. This results in a short circuit of the electrodes.

50 This is a clarification of what is being modified from the Part 1 Standard.

51 Appliance installed in areas open to the public can be located on the floor or where they would be accessible to children up to 3 years in age, so test probe 19 is applicable. However, appliances and parts of appliances located above 850 mm from the floor are not considered to be within reach of these children, so test probe 19 is not applied.

52 This is removed because it is the same as the impact energy specified in the Part 1 Standard.

53 This requirement is to prevent an unintentional conductive bridge due to a liquid leakage between the equipotential bond and the supply of the electrodes on the outside of the heating chamber. Because the equipotential bond is established through the requirements as safe to access, a conductive bridge to the supply would result in live parts becoming accessible.

54 A drain hole needs to meet the minimum dimensions or it is considered to be blocked when determining compliance.

55 Due to the addition of Subclause 5.21 in IEC 60335-1:2020, the force applied to test probe B is specified to align with that specified in Subclause 20.2 of the Part 1 Standard.

56 This is updated to align with IEC 60335-1:2020 and changes made in Subclause 20.2 of this Standard.

57 This content is relocated as definitions for food area and splash area in Clause 3.

58 This is added to align with requirements in other Part 2 Standards, where the appliance may have multiple heating elements or motors that are not intended to operate simultaneously.

59 The double or reinforced insulation is required between the electrodes and circuitry in direct contact with the electrodes on the secondary side of the transformer and other conductive parts. The access to these parts is additionally restricted with the test requirement with test probe B. This requirement ensures that any potential in direct contact with the electrodes is not accessible.

60 This requirement ensures the proper implementation of the equipotential bonding connection by:

- specifying the type of the contacts
- placing them within the appliance to not continuously expose them to circulating air. Continuous exposure to circulating air facilitates the evaporation of the liquid and gives the potential to build up residues at the exposed surfaces
- ensuring that the distance between the bonding contacts and electrodes is larger than the distance between the electrodes to mitigate the possibility of an arc between the electrodes and the contacts
- defining the minimal contact area between the liquid and the contact
- verifying the resistance and current-carrying capacity of the bond. The bond needs to be tested for the current-carrying capacity at the operating frequency of the current applied to the electrodes, which might be well above 30 kHz if a switch-mode power supply drives the transformer/electrodes.

61 This requirement ensures the safety of the user by limiting the prospective touch current when touching the inflowing and outflowing liquid simultaneously in the case of a failure of the equipotential bonding. In addition, the requirement covers the situation where the inflowing or outflowing liquid is in contact with the earth.

62 The risk related to generation of hydrogen gas is addressed by limiting the amount created as verified using the test procedure of IEC 60335-2-108 and ensure that there is no space where hydrogen gas can accumulate within the heating chamber during normal operation.

63 This is a clarification of what is being modified from the Part 1 Standard.

64 The electrodes of an electrode-type heating appliance may be supplied by an isolating transformer as specified in Subclause 22.115. This addition specifies the relevant Standard for isolating transformers and requirements in Annex BB for evaluation if the transformer was not previously evaluated to this Standard.

65 Users and maintenance persons do not have access to the service area. A thermal cut-out does not need to be trip-free if it is located in the service area.

66 Connection of the earth to the electrodes and circuitry in direct contact with the electrodes would present a risk of electric shock because this would defeat the isolation provided by the isolating transformer specified in Subclause 22.115.

67 Appliance installed in areas open to the public can be located on the floor or where they would be accessible to children up to 3 years in age, so test probe 19 is applicable. However, appliances and parts of appliances located above 850 mm from the floor are not considered to be within reach of these children, so test probe 19 is not applied.

68 Appliance installed in areas open to the public can be located on the floor or where they would be accessible to children up to 3 years in age, so test probe 19 is applicable. However, appliances and parts of appliances located above 850 mm from the floor are not considered to be within reach of these children, so test probe 19 is not applied.

69 Annex R is updated to refer to Subclause 22.114 because software relied upon for compliance with Subclause 22.114 is required to comply with Annex R.

70 Annex BB is added for evaluation of isolating transformers used in electrode-type heating appliances if not previously evaluated to IEC 61558-2-4.

IEC 60335-2-75

Edition 4.0 2024-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Household and similar electrical appliances – Safety –
Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

Appareils électrodomestiques et analogues – Sécurité –
Partie 2-75: Exigences particulières pour les distributeurs commerciaux avec ou sans moyen de paiement

IEC 60335-2-75:2024-11 (en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60335-2-75 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2012, Amendment 1:2015 and Amendment 2:2018. This edition constitutes a technical revision.

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

a) alignment with IEC 60335-1:2020;
b) conversion of some notes to normative text (Clause 1, 7.1, 19.2, 19.101);

c) addition of requirements for electrode-type liquid heaters (Clause 1, 3.1.9, 3.6.101, 3.7.103, 13.2, 13.3, 16.2, 16.3, 19.1, 19.103 to 19.106, 22.6, 22.33, 22.115 to 22.118, 24.1.2, 27.1, Annex BB);

d) addition of test requirements for appliances with a recommended ambient temperature above 25 °C (5.7);

e) application of test probes 18 and 19 (8.1.1, 20.2, 22.101, B.22.3, B.22.4);

f) addition of accessible surface temperature limits including marking of hot surfaces (7.1, 7.6, 7.12, 7.14, 7.15, 11.3, 11.8);

g) addition of requirements to prevent simultaneous operation of multiple loads (22.114, Annex R);

h) clarification of requirements for thermal cut-outs located in a service area (24.103).

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

Draft	Report on voting
61/7301/FDIS	61/7344/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/publications.

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

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

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

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial dispensing appliances and vending machines.

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

NOTE 2 The following numbering system is used:

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

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

– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type;

– *test specifications: in italic type;*

– notes: in small roman type.

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

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

- reconfirmed,
- withdrawn, or
- revised.

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

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

The following differences exist in the countries indicated below.

– 6.1: Class 0I is allowed for appliances used indoors having a rated voltage not exceeding 150 V (Japan).
– 13.2: The leakage current limits are different (Japan).
– 16.2: The leakage current limits are different (Japan).

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features 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 of measuring performance;
– CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
– CISPR 14-2 concerning electromagnetic immunity;
– IEC standards published by TC 111 concerning environmental matters.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-75: Particular requirements for commercial dispensing appliances and vending machines

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric commercial **dispensing appliances** and **vending machines** for preparation or delivery of food, drinks and consumer products, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances including direct current (DC) supplied appliances and **battery-operated appliances**.

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

– bulk tea or coffee brewing machines;
– cigarette **vending machines**;
– coffee grinders for use in areas open to the public;
– commercial liquid heaters;
– coffee makers with or without integrated coffee grinder;
– coffee makers with cooling systems;
– hot and cold beverage **vending machines**;
– hot water **dispensers**;
– ice cream and whipped cream **dispensers**;
– ice **dispensers**;
– newspaper, audio or video tape or disc **vending machines**;
– packaged food and drink **vending machines**;
– refrigerated merchandisers;
– appliances incorporating **electrode-type liquid heaters**.

Appliances can have more than one function.

Other standards can be applicable for some functions such as:

– refrigeration (IEC 60335-2-89);
– heating by microwaves (IEC 60335-2-90);
– professional ice cream makers (IEC 60335-2-118).

This standard also deals with the hygiene aspects of appliances.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by users and **maintenance persons**. However, in general, it does not take into account young children playing with the appliance.

Attention is drawn to the fact that:

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

This standard does not apply to:

– appliances intended to be used exclusively for household purposes;
– appliances intended to be used 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);
– commercial coffee grinders for use in areas not open to the public (IEC 60335-2-64);
– commercial electric boiling pans (IEC 60335-2-47);
– commercial electric bains-marie (IEC 60335-2-50);
– amusement machines and personal service machines (IEC 60335-2-82);
– commercial refrigerating appliances (IEC 60335-2-89);
– appliances solely used for dispensing money;
– display cabinets;
– requirements for dispensed **potentially hazardous food** (these are covered by national health regulations in many countries).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60287-1-1:2023, *Electric cables – Calculation of the current rating – Part 1-1: Current rating equations (100 % load factor) and calculation of losses – General*

IEC 60320-1:2021, *Appliance couplers for household and similar general purposes – Part 1: General requirements*

IEC 60335-2-34:2021, *Household and similar electrical appliances – Safety – Part 2-34: Particular requirements for motor-compressors*

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

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications*

ISO 1817:2022, *Rubber, vulcanized or thermoplastic – Determination of the effect of liquids*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Modification:*
normal operation

Replace the first paragraph with the following:

operation of the appliance under the following conditions:

The appliance is operated in the **ready mode** until steady conditions are established and then under the most unfavourable dispensing procedure. The appliance is refilled when necessary in accordance with the instructions for use, or the **instructions for maintenance**, and the next operating period is immediately started.

Lids and covers of **appliances of the professional type** and of **appliances of the supervised type** are placed in their intended positions.

Coffee makers are operated with their container filled with the **rated capacity** of water, or connected to the water mains, if applicable. Coffee makers with a heated surface intended to keep the liquid warm are operated with or without the container, whichever is the more unfavourable.

For appliances incorporating **electrode-type liquid heaters**, each **electrode-type liquid heater** is supplied from a container filled with water having a conductivity in the conductivity range assigned to the heater by the manufacturer. Unless otherwise specified, the supply containers are filled with water having a conductivity equal to the upper limit of the assigned conductivity range at a temperature of 15 °C ± 5°°C.

Note 1 to entry: The appropriate conductivity can be obtained by adding sodium chloride to the water.

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

3.5 Definitions relating to types of appliances

3.5.101
dispensing appliance
appliance intended to deliver or make available food, drinks or other consumer products

Note 1 to entry: The appliance can also prepare the products.

Note 2 to entry: The dispensing operation can be initiated manually or by means such as coins or credit cards.

3.5.102
vending machine
dispensing appliance that is operated by coins, credit cards or other means of payment

3.5.103
appliance of the professional type
dispensing appliance that is only intended to be used by trained personnel such as kitchen or bar staff

3.5.104
appliance of the supervised type
dispensing appliance that is intended to be maintained by trained personnel but can be used by other persons in a location where its use is overseen

Note 1 to entry: Dining rooms in restaurants are examples of such locations.

3.5.105
espresso coffee maker
coffee maker in which water is heated and forced through the ground coffee by steam pressure or by means of a pump

Note 1 to entry: **Espresso coffee makers** can have an outlet for supplying steam or hot water.

3.6 Definitions relating to parts of an appliance

3.6.2 *Replacement:*
detachable part
part that can be removed without the aid of a **tool**, a part that is removed in accordance with the instructions for use or the **instructions for maintenance**, even if a **tool** or **access key** is necessary for removal, or a part that does not fulfil the test of 22.11

Note 1 to entry: If a part has to be removed for installation purposes, this part is not considered to be detachable even if the instructions state that it is to be removed.

Note 2 to entry: A part that can be opened is considered to be a part that can be removed.

3.6.101
electrode-type liquid heater
liquid heater in which a conductive liquid is heated by a current flowing through it

3.6.102
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 or the warming plate of a coffee machine.

3.7 Definitions relating to safety components

3.7.3 *Replacement:*
thermal cut-out
device that during abnormal operation limits the temperature of the controlled part by automatically opening the circuit, or reducing the current, and is constructed so that its setting cannot be altered by the user or the **maintenance person**

3.7.101
access key
key or other means that gives access to the **maintenance area** but does not give access to the **service area**

Note 1 to entry: "Other means" includes a **tool** or operation by codes or signals produced by optical or electromagnetic sources.

3.7.102
override key
key or other means that is used to render an interlock inoperative

3.7.103
isolating transformer
transformer, the input winding of which is electrically separated from the output winding by an insulation of at least equivalent to **double insulation** or **reinforced insulation**, that is intended to supply an appliance or circuit at a voltage higher than **safety extra-low voltage**

3.8 Definitions relating to miscellaneous matters

3.8.101
ready mode
state of the appliance when filled as intended with ingredients or products, energized and ready for use, cash boxes and overflow containers being empty

3.8.102
instructions for maintenance
instructions explaining how to carry out **maintenance operations** in the **maintenance area**

3.8.103
maintenance person
person who maintains the appliance in accordance with the **instructions for maintenance**

3.8.104
user area
area where access is gained without the use of an **access key** or a **tool**

Note 1 to entry: The **user area** of **appliances of the supervised type** is determined with **detachable parts** and other movable parts, such as doors and lids, in position as in normal use.

Note 2 to entry: **Appliances of the professional type** have no **user area**.

3.8.105
maintenance area
area where access can only be gained by the use of an **access key**

3.8.106
service area
area where access cannot be gained by the use of an **access key** alone

3.8.107
potentially hazardous food
food which includes natural or synthetic ingredients that are capable of supporting rapid and progressive growth of pathogenic or toxin producing micro-organisms

Note 1 to entry: Examples of **potentially hazardous food** are milk, eggs, meat, poultry, shellfish, crustaceans, and their products, either raw or heat treated, as well as food of plant origin that is ready for consumption without the need for any further preparation or processing.

Note 2 to entry: Food can become **potentially hazardous food** during processing, for example when powdered ingredients are mixed with water or when food is stored at incorrect temperature.

Note 3 to entry: **Potentially hazardous food** does not include:

– candy, nuts, gum and similar confectionery;
– cookies, crackers and similar bakery products;
– instant-coffee, chocolate, cocoa and sugar;
– food having a pH level of not greater than 4,6 or a water activity (Aw) value not greater than 0,85 at 25 °C;
– food maintained at a temperature not exceeding 5 °C for periods specified by the producer, but for not more than 5 days;
– food maintained at a temperature above 65 °C or below –18 °C;
– food in hermetically sealed containers;
– food that has been processed to prevent spoilage.

3.8.108
maintenance operation
any maintenance stated in the **instructions for maintenance**, that the **maintenance person** is intended to perform in the **maintenance area**

Note 1 to entry: **Maintenance operation** does not include operations performed in the **service area**.

Note 2 to entry: Examples of **maintenance operations** are preparing the appliance for new products or new operating methods, cleaning, price changing, replenishing, coin collecting and setting of controls.

Note 3 to entry: **Vending machines** and **dispensing appliances** can have **maintenance areas** that are not accessible to users. The specific maintenance in these areas is to be carried out by the **maintenance person**.

3.8.109
food area
area that comprises surfaces in contact with the food and surfaces that the food can contact during preparation of the product

3.8.110
non-food area
area in the appliance other than a **food area**

3.8.111
splash area
area that comprises surfaces on which part of the food can splash or flow during normal use but so that this food does not become part of the product

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

If the test of 15.102 has to be carried out, three additional samples are required.

If the tests of normative Annex BB are carried out, four additional transformers are necessary.

5.6 *Addition:*

*Controls, switching devices or other parts in the **maintenance area** are adjusted to the most unfavourable setting within limits stated in the **instructions for maintenance**. Controls or switching devices in the **service area** are not adjusted.*

5.7 *Addition:*

For appliances with a recommended ambient temperature above 25 °C the tests of Clause 10, Clause 11 (except 11.101) and Clause 13 are carried out at the recommended maximum ambient temperature $^{+5}_{-0}$ °C.

5.9 *Addition:*

When alternative software is made available by the appliance manufacturer, the appliance is tested with the software that gives the most unfavourable results.

5.10 *Addition:*

NOTE 101 **Access keys** and **override keys** can be supplied separately from the appliance.

Appliances are installed in accordance with the instructions provided with the appliance before testing.

If the instructions state that the appliance may be installed together with other appliances, the effect of this combination is taken into account.

5.101 *Appliances intended to be connected to the water mains are supplied with water having a temperature of 15 °C ± 5 °C and the most unfavourable pressure specified in the instructions. For appliances that are manually filled with water, the temperature of the water is 15 °C ± 5 °C.*

For appliances intended to cool water, the temperature of the water is 25 °C ± 5 °C.

5.102 *The requirements of this standard for the **maintenance area** are applicable when the **instructions for maintenance** are being followed. If an **access key** is provided for access to the **maintenance area**, it is used before a test is carried out if this is more unfavourable.*

5.103 ***Appliances of the professional type** and **appliances of the supervised type** are tested as **heating appliances** even if they incorporate a motor. If these appliances do not contain heating elements, they are tested as **motor-operated appliances**.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Replace the first paragraph with the following:

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

6.2 *Addition:*

Appliances intended for outdoor use shall be at least IPX4.

Appliances intended to be cleaned by water jets or installed where water jets are liable to be used shall be at least IPX5.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances shall be marked with:

– their **rated pressure**, in megapascals, if applicable;
– the maximum permissible water pressure, in megapascals, for appliances intended to be connected to the water mains.

Appliances intended to be filled by hand shall have means, such as a level mark or audible or visual signal, that indicate when the required level for correct operation has been reached.

Appliances intended to be partially immersed in water for cleaning shall be marked with the maximum level of immersion and with the substance of the following:

Do not immerse beyond this level.

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

7.3 *Addition:*

The requirement also applies when the adjustment has to be made by the **maintenance person**.

7.6 *Addition:*

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

caution, hot surface

7.8 *Addition:*

Terminals for equipotential bonding shall be indicated by symbol IEC 60417-5021 (2002-10).

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

7.12 *Addition:*

The instructions for appliances incorporating **electrode-type liquid heaters** shall state for each heater:

– the liquids intended to be used with the heater;
– the potential consequences of using liquids other than the intended liquids;
– the conductivity range for **normal operation**, expressed by its lower and upper limits in mS/cm.

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

7.12.1 *Addition:*

The installation instructions for appliances intended to be connected to the water mains shall specify the means of connection and draw attention to any national rules that can be applicable.

The installation instructions shall state if the appliance is suitable for outdoor use.

The installation instructions shall state the maximum and minimum ambient temperatures for correct operation.

For appliances that are not at least IPX5, the instructions shall state that the appliance is not suitable for installation in an area where a water jet could be used.

The installation instructions shall state the maximum tilt of the appliance for normal use. It is not necessary for a tilt of less than 2° to be stated. An instruction such as "the appliance has to be placed in a horizontal position" is sufficient.

The installation instructions for **appliances of the professional type** shall state that the appliance is only to be installed in locations where its use and maintenance is restricted to trained personnel.

The installation instructions for **appliances of the supervised type** shall state that the appliance is only to be installed in locations where it can be overseen by trained personnel. The installation instructions for appliances, other than **appliances of the professional type** and **appliances of the supervised type**, shall state that the appliance is intended to be used in an area open to the public.

The installation instructions for **class I appliances of the professional type** that are intended to be permanently connected to fixed wiring and have a leakage current that can exceed 10 mA shall state that the installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable.

7.12.101 If it is necessary to take special precautions during **maintenance operations**, details of these shall be supplied. The **instructions for maintenance** shall state how to gain access to the **maintenance area** including how to use the **access key** and the **override key**. They shall not include instructions on how to gain access to a **service area**.

The **instructions for maintenance** shall specify the method and frequency of cleaning. They shall include details for descaling, disinfecting, flushing and removal of any residual cleaners, sterilizers or descalers from the appliance, if applicable. Recommended cleaning or disinfecting agents shall be specified, and they may be identified by their chemical denomination.

If the appliance is not at least IPX5, the **instructions for maintenance** shall state that the appliance must not be cleaned by a water jet.

The **instructions for maintenance** for appliances incorporating an appliance inlet and intended to be partially or completely immersed in water for cleaning shall state that the connector must be removed before the appliance is cleaned and that the appliance inlet must be dried before the appliance is used again.

If the use of an **override key** allows access to moving parts, a suitable warning shall be given in the **instructions for maintenance**.

The **instructions for maintenance** shall list any accessories that may be used with the appliance.

The **instructions for maintenance** shall state the maximum and minimum ambient temperatures for correct operation.

For appliances using water, the **instructions for maintenance** shall give details concerning the prevention of freezing or what to do if freezing occurs.

The **instructions for maintenance** for appliances containing pressurized gas shall give details on the handling of the pressurized containers and of the gas.

The **instructions for maintenance** shall specify the types of food for which the appliance is suitable and give details on how to ensure hygienic operation.

Compliance is checked by inspection.

7.12.102 The instructions shall state that access to the **service area** is restricted to persons having knowledge and practical experience of the appliance, in particular as far as safety and hygiene are concerned.

Compliance is checked by inspection.

7.14 *Addition:*

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

7.15 *Addition:*

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

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1.1 *Addition:*

*Test probe 18 and test probe 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Modification:*

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

– *appliances intended to be fixed to a floor or table, and those having a mass greater than 40 kg and not provided with casters or rollers, are installed in accordance with the instructions. If no instructions are provided, the appliance is placed on a floor or table as close to the walls as possible;*

– *other appliances intended to be placed on a floor or table, are placed on a floor or table as near to the walls as possible;*

11.3 *Addition:*

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

***Heating appliances** with **electronic circuits** controlling the power input are operated as **combined appliances**.*

*If the temperature rise limits are exceeded in appliances incorporating motors, transformers or **electronic circuits**, and if the power input is lower than the **rated power input**, the test is repeated with the appliance supplied at 1,06 times the **rated voltage**.*

11.6 *Addition:*

***Combined appliances** without electronic power controls are operated as **heating appliances**.*

11.7 *Addition:*

*The appliance is operated under **normal operation** until steady conditions are established, the appliance being refilled when necessary.*

NOTE 101 Refilling can require the use of an **access key**.

11.8 *Addition:*

During the test, the temperature rises of external ***accessible surfaces*** *of* ***appliances of the professional type*** *and external* ***accessible surfaces*** *in the* ***maintenance area*** *of all appliances shall not exceed the values shown in Table 101.*

The temperature rises of external ***accessible surfaces*** *in the* ***user area*** *shall not exceed the values shown in Table 102.*

The temperature rise of handles or grips of vents and air shutters shall not exceed the value specified in Table 3 for surfaces of handles, knobs, grips and similar parts which are held for short periods only in normal use.

The temperature rise limits of motors, transformers and components of ***electronic circuits****, including parts directly influenced by them, may be exceeded when the appliance is operated at 1,15 times the* ***rated power input****.*

Table 101 – Maximum temperature rises for specified external accessible surfaces of appliances of the professional type and in the maintenance area of all appliances under normal operating conditions

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

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

[a] *Temperature rises are not measured on:*

- *the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the rear surface of appliances which, according to the instructions, shall be placed against a wall and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- ***functional surfaces*** *and surfaces within 25 mm of the* ***functional surface****;*
- *hot water supply fittings, hoses, valves and sight gauges;*
- *lids and covers over heated spaces of* ***heating appliances*** *and* ***combined appliances****;*
- *the hot water / vapour / coffee / tea and similar fluids fittings and hoses;*
- *vessels that contain hot liquids and that become hot through conduction by a heated part of the appliance or by contact with the hot liquids (e.g. coffee pots in percolator type coffee makers and kettles).*

[b] *For* ***heating appliances*** *and* ***combined appliances****, the temperature rise on externally* ***accessible surfaces*** *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 powder, 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 for specified external accessible surfaces in the user area 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*
NOTE The temperature rise limits of handles, knobs, grips, keyboards, keypads and similar parts are specified in Table 3.		

[a] *Temperature rises are not measured on:*

- *the underside of appliances intended to be used on a working surface or floor, where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the rear surface of appliances which, according to the instructions, shall be placed against a wall and where these surfaces are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- ***functional surfaces*** *and surfaces within 25 mm of the* ***functional surface****;*
- *hot water supply fittings, hoses, valves and sight gauges;*
- *lids and covers over heated spaces of* ***heating appliances*** *and* ***combined appliances****;*
- *the hot water / vapour / coffee / tea and similar fluids fittings and hoses;*
- *vessels that contain hot liquids and that become hot through conduction by a heated part of the appliance or by contact with the hot liquids (e.g. coffee pots in percolator type coffee makers and kettles).*

[b] *For* ***heating appliances*** *and* ***combined appliances****, the temperature rise on externally* ***accessible surfaces*** *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 powder 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.*

11.101 *Appliances incorporating refrigerating equipment, and having motor-compressors that do not comply with IEC 60335-2-34:2021 including its normative Annex AA, are also tested at an ambient temperature of*

- *32 °C, for appliances for temperate countries;*
- *43 °C, for appliances for tropical countries.*

Other parts of the appliance are operated to produce the most unfavourable conditions in the refrigerating system.

Temperature rises of parts of the appliance, other than the motor-compressor, are not determined.

The temperature of windings and the enclosure of motor-compressors shall not exceed the following values:

– *140 °C, for windings of motor-compressors with synthetic insulation;*
– *130 °C, for windings of motor-compressors with cellulosic insulation;*
– *150 °C, for external enclosures of motor-compressors.*

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

Replace the last two dashed items in the eighth paragraph with the following:

– *for **stationary class I appliances of the professional type** intended to be permanently connected to fixed wiring;*	*1 mA per kW **rated power input** of the appliance, with no maximum;*
– *for other **stationary class I appliances of the professional type***	*1 mA per kW **rated power input** of the appliance, with a maximum of 10 mA;*
– *for other **stationary class I heating appliances***	*0,75 mA or 0,75 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher .*

Addition:

*For appliances incorporating **electrode-type liquid heaters**, the leakage current is additionally measured between any pole of the supply and the equipotential bonding connection of the inflowing and outflowing liquid. If frequencies above 30 kHz are involved, measurement of the leakage current shall include measurement with regard to electric burn effects. For burn effects, the unweighted RMS value of the current is relevant. The unweighted current is calculated from the RMS voltage U1, which is measured across the 500 Ω resistor of IEC 60990:2016, Figure 4. The unweighted current shall not exceed 10 mA.*

*For appliances incorporating **electrode-type liquid heaters** with the equipotential bonding specified in 22.116 connected to the earthing terminal within the appliance or to the earthing contact of the appliance inlet, the current between a metal sieve positioned in the water 10 mm away from the orifice of the appliance liquid outlet and the earthing terminal is measured as shown in Figure 102 for single-phase appliances and in Figure 103 for three-phase appliances. For three-phase appliances with neutral (3N~), the current is measured with the switches a, b and c in the closed position. The measurements are then repeated with each of the switches a, b and c open in turn, the other two switches remaining closed. For three-phase without neutral (3~) connected appliances, the measuring circuit Figure 103 shall be used as applicable, but the neutral is not connected to the appliance. The current shall not exceed 0,25 mA.*

*For appliances incorporating **electrode-type liquid heaters**, the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

NOTE 101 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity.

13.3 *Addition:*

For appliances incorporating ***electrode-type liquid heaters****, the test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and* ***accessible parts****. Instead, the test voltage shall be applied on opposing sides of the insulating material providing insulation according to 22.115 provided that:*

– *it is within the required* ***creepage distance*** *of the conductive parts, or*

– *it is within the required* ***clearance*** *of the conductive parts.*

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:*

Appliances of the professional type *classified IPX3 or lower, and intended to be placed on a kitchen floor, are subjected to a test in which water under pressure is indirectly splashed onto the appliance. The splash apparatus is shown in Figure 104. The appliance is placed in normal position of use and adjustable feet shall be set in accordance with the instruction for use to the most unfavourable height.*

The bowl is placed on the floor and is moved around in such a way as to splash the appliance from all directions. During the test, the water pressure adjusted so that the water splashes to a height of 150 mm above the bottom of the bowl. The bowl is not positioned underneath the appliance. The apparatus is moved around the appliance in order to splash it from all directions for a total of 5 min.

15.2 *Replacement:*

Appliances subject to spillage of liquids or solids in normal use shall be constructed so that spillage does not affect their electrical insulation. The electrical insulation shall not be affected by cleaning, disinfecting, descaling and similar operations.

Compliance is checked by the tests of 15.2.101 to 15.2.113.

The spillage solution used for the tests shall be comprised of water containing approximately 1 % NaCl and 0,6 % rinsing agent. Any commercially available non-ionic rinsing agent may be used, but if there is any doubt with regard 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 comprise the following substances:*
  - *nonionic surfactant (i.e. plurafac ® LF 221[1]) 15,0 % parts by mass*
  - *cumene sulfonate (40 % solution) 11,5 % parts by mass*
  - *citric acid (anhydrous) 3,0 % parts by mass*
  - *deionized water 70,5 % parts by mass*

*Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cord of the smallest cross-sectional area specified in Table 11.*

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

*Before each test, the appliance is operated in the **ready mode**. Containers that are connected to the water mains are prefilled with saline solution.*

*After each overfilling or application of liquid, the appliance shall withstand the electric strength test of 16.3 and inspection shall show that there is no trace of liquid or solids on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29. All residues are then removed and the appliance is dried.*

***Detachable parts** in the **user area** are removed or placed in the most unfavourable position.*

***Detachable parts** in the **maintenance area** are placed in the position according to **instructions for maintenance** following a **maintenance operation**.*

***Detachable parts** of **appliances of the professional type** are placed in their most unfavourable position during normal use.*

15.2.101 *Containers for ingredients or products in powdered or granulated form are filled with dry granulated sugar, ignoring any level indication. A further quantity equal to 15 % of the total capacity of the container is then poured in steadily over a period of 1 min.*

Containers that are intended to be filled outside the appliance are replaced without removing any excess sugar from the outside of the container. Lids are replaced after overfilling.

15.2.102 *Liquid containers that are filled manually are filled with the spillage solution and a further quantity equal to 15 % of the total capacity of each container or 0,25 l, whichever is the greater, is poured in steadily over a period of 1 min.*

15.2.103 *The outlets of liquid mixing containers are blocked and the containers are filled with the spillage solution. A further quantity equal to 15 % of the total capacity of each container*

[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. Equivalent products may be used if they can be shown to lead to the same results.

or 0,25 l, whichever is the greater, is poured in steadily over a period of 15 s. If the container has more than one independent outlet, they are blocked in turn.

15.2.104 *Drains for liquid waste containers are blocked and the containers are filled with the spillage solution. A further quantity equal to 15 % of the total capacity of each container or 0,25 l, whichever is the greater, is poured in steadily over a period of 15 s. If the container has more than one independent drain, they are blocked in turn. If there is more than one container, they are tested in turn.*

15.2.105 *Drain taps of containers used during **maintenance operations** are adjusted in turn to the most unfavourable position. The appliance is supplied at **rated voltage** and operated under **normal operation** until the flow of the spillage solution stabilizes.*

15.2.106 *Failure of the inlet valve of appliances connected to the water mains is simulated. Water is allowed to flow for 1 min after the first evidence of overflow unless the inflow stops automatically. The failure of only one device is tested at a time.*

15.2.107 *Appliances dispensing liquid into a serving container, such as a cup or jug, are tested by rapidly pouring 0,5 l of the spillage solution over the surface where the container is filled, transported and removed by the user.*

15.2.108 *Appliances with accessible openings, including slots for coins or cards, other than **appliances of the professional type** and **appliances of the supervised type**, are tested by slowly pouring 0,25 l of the spillage solution into each opening. If the opening is in a vertical surface, the solution is projected towards the opening.*

15.2.109 *Appliances having external surfaces on which it is possible to place a vessel, such as a cup or jug, are tested by rapidly pouring 0,5 l of the spillage solution over the surface. The quantity of the spillage solution is increased to 5 l for **appliances of the professional type** if their highest surface is lower than 1,5 m. The test is carried out even if the appliance does not dispense liquid. If there is more than one surface, they are tested in turn.*

*For **espresso coffee maker of the professional type**, the amount of the spillage solution is increased to 5 l only if the highest surface after installation is lower than 1,2 m.*

15.2.110 *Appliances delivering prepacked products are tested to simulate leakage from the package over any area where the package is stored or transported.*

Leakage from liquid products is simulated by rapidly pouring a quantity of the spillage solution, equal in volume to the largest prepacked product that can be delivered from the appliance, over the area.

Leakage from dry products is simulated by rapidly pouring a quantity of dry granulated sugar, equal in volume to the largest prepacked product that can be delivered from the appliance, over the area. This test is not applicable to appliances intended to deliver only solid products such as newspapers, films or cigarettes.

15.2.111 **Maintenance operations** *involving the use of liquids are carried out three times.*

15.2.112 *Parts liable to be cleaned are wiped with a sponge, having dimensions approximately 150 mm × 75 mm × 50 mm, saturated with the spillage solution. The sponge is applied without appreciable force for approximately 10 s to each surface. This test is not applied to surfaces in the **maintenance area** for which cleaning instructions are given.*

15.2.113 *Appliances subject to descaling are descaled 10 times in accordance with the **instructions for maintenance**. The appliance is then operated in the **ready mode**.*

15.3 *Addition:*

If it is not possible to place the appliance in the humidity cabinet, electrical parts are tested separately.

15.101 Appliances having a tap that provides water for filling or cleaning shall be constructed so that the water cannot come into contact with **live parts** or affect electrical insulation.

Compliance is checked by the following test.

The appliance is connected to the water mains, the pressure being adjusted to the maximum water pressure marked on the appliance. Tiltable and movable parts, including lids, are placed in the most unfavourable position. The tap is fully opened for 1 min, swivel outlets being adjusted to direct the water in the most unfavourable direction. The appliance shall then withstand the electric strength test of 16.3.

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

Compliance is checked by the following tests, which are carried out on three additional appliances.

*The appliances are operated under **normal operation** at 1,15 times **rated power input**, until the **thermostat** operates for the first time. Appliances without a **thermostat** are operated until steady conditions are established. The appliances are disconnected from the supply, any appliance connector being withdrawn. They are then completely immersed in water containing approximately 1 % NaCl and having a temperature between 10 °C and 25 °C, unless they are marked with the maximum level of immersion, in which case they are immersed 50 mm deeper than this level.*

After 1 h, the appliances are removed from the saline solution, dried and subjected to the leakage current test of 16.2.

This test is carried out four more times, after which the appliances shall withstand the electric strength test of 16.3, the voltage being as specified in Table 4.

*The appliance having the highest leakage current after the fifth immersion is dismantled and inspection shall show that there is no trace of liquid on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

*The remaining two appliances are operated under **normal operation** at 1,15 **times rated power input** for 240 h. After this period, the appliances are disconnected from the supply and immersed again for 1 h. They are then dried and subjected to the electric strength test of 16.3, the voltage being as specified in Table 4.*

*Inspection shall show that there is no trace of liquid on insulation that could result in a reduction of **clearances** and **creepage distances** below the values specified in Clause 29.*

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.2 *Modification:*

Replace the last two dashed items in the fourth paragraph with the following:

– *for **stationary class I appliances of the professional type** intended to be permanently connected to fixed wiring*	*2 mA per kW **rated power input** of the appliance, with no maximum;*
– *for other **stationary class I appliances of the professional type***	*2 mA per kW **rated power input** of the appliance, with a maximum of 10 mA;*
– *for other **stationary class I heating appliances***	*0,75 mA or 0,75 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher.*

Addition:

*For appliances incorporating **electrode-type liquid heaters**, the AC test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and **accessible parts**.*

16.3 *Addition:*

*For appliances incorporating **electrode-type liquid heaters**, the test voltage is not applied between the electrodes, or the circuitry in direct contact with the electrodes, and **accessible parts**. Instead, the test voltage shall be applied on opposing sides of the insulating material providing insulation according to 22.115 provided that:*

– *it is within the required **creepage distance** of the conductive parts, or*

– *it is within the required **clearance** of the conductive parts.*

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Addition:*

Appliances are also subjected to the tests of 19.101 and 19.102, if applicable.

***Detachable parts** in the **user area** are removed or placed in the most unfavourable position.*

***Detachable parts** in the **maintenance area** are placed in the position according to **instructions for maintenance** following a **maintenance operation**.*

Containers are filled to the most unfavourable level.

Appliances having a control that limits the pressure during the tests of Clause 11 are subjected to the tests of 19.4 with this control rendered inoperative.

*Appliances incorporating **electrode-type liquid heaters** are subjected to the tests of 19.103 to 19.106. Unless otherwise specified, the appliance is operated with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

NOTE 101 The appropriate conductivity can be obtained by adding sodium chloride to the water.

NOTE 102 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increasing the conductivity.

19.2 *Addition:*

Examples of achieving restricted heat dissipation are

– operating without water;
– switching off the fan;
– covering ventilation openings.

19.4 *Addition:*

If a control also performs other functions, only the part controlling the temperature or pressure is rendered inoperative.

19.11.2 *Modification:*

Replace the penultimate paragraph with the following:

When any of the fault conditions are simulated, the duration of the test is until steady conditions are established.

19.13 *Addition:*

During the tests, molten plastic shall not be emitted.

Liquid having a temperature above 80 °C, steam or solid objects shall not be emitted from places that are not intended according to instruction and in a way likely to cause injury to persons.

After the tests, compliance with 15.1 and 15.2 shall not be impaired. The electric strength test of 16.3 shall be carried out after each test if it is expected that the electrical insulation could be affected.

19.101 *The appliance is supplied at **rated voltage** and operated under **normal operation**. Fault conditions likely to occur during use of the appliance are introduced one at a time.*

If operation without water in the appliance is considered to be a more unfavourable condition, the tests are carried out with the water supply valve closed. The water supply valve is not closed during the dispensing operation.

Damaged components or parts can be replaced after each test.

Examples of fault conditions are:

– *defects in the appliance:*
  - *a programmer stopping in any position;*
  - *disconnection and reconnection of one or more phases of the supply mains during any part of the programme;*
  - *open-circuiting or short-circuiting of components;*
  - *locking the main contacts of a contactor in the "on" position if they are used for energizing heating elements. However, this defect is not introduced if at least two independent sets of contacts are provided. This can be achieved by two contactors operating independently of each other or by one contactor having two independent armatures operating two independent sets of main contacts;*
  - *failure of a magnetic valve;*
  - *failure of a pneumatic or hydraulic control;*
  - *blocking the coin or product channels. If blockage can be noticed from the outside of the appliance, further delivery is not attempted, otherwise the appliance is operated until no further delivery is possible. The wrapping of products in conductive materials has to be taken into account;*
– *faulty operation by users or* ***maintenance persons****:*
  - *incorrect actuation of knobs, handles, switches or push-buttons;*
  - *interrupting the dispensing operation by available facilities;*
  - *incorrect opening or closing of doors or lids;*
  - ***instructions for maintenance*** *are not followed;*
  - *incorrect routine cleaning. The sponge test of 15.2.112 is applied to all surfaces in the* ***user area****. It is also applied to all surfaces in the* ***maintenance area****, except those for which cleaning instructions are given;*
  - *setting controls, switches or programmers in the most unfavourable position;*
  - *incorrect loading;*
  - *incorrect coin collection;*
– *abuse by users:*
  - *obstructing dispensing openings;*
  - *blocking moving parts.*

In general, tests are limited to the fault conditions that give the most unfavourable results.

19.102 *Appliances incorporating a* ***thermal cut-out*** *of the capillary type are tested as specified in 19.4 but with the capillary tube ruptured.*

19.103 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with water having a conductivity equal to the lower limit of the conductivity range assigned to the heater. The appliance is then operated until steady conditions are established. The conductivity of the water in the supply container is then decreased by 10 % and the appliance is operated again until the termination conditions of 19.1 are reached. If steady conditions are established and the continuous voltage across the electrodes increased with respect to the previous operating cycle, the conductivity is again decreased and the test is repeated until the voltage across the electrodes does not increase.*

During the test, the leakage current limits of 13.2 apply.

19.104 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with water having a conductivity equal to the upper limit of the conductivity range assigned to the heater. The appliance is then operated until steady conditions are established. The conductivity of the water in the supply container is then increased by 10 % and the appliance is operated again until the termination conditions of 19.1 are reached. If steady conditions are established, the conductivity is again increased and the test is repeated.*

During the test, the leakage current limits of 13.2 apply.

19.105 *Appliances are operated so that the **electrode-type liquid heater** successfully performs a heating cycle and the heater fills with water. The appliance is then operated for one cycle under conditions of **normal operation** with the water supply of the heater shut off so that no water is supplied to the heater during the operation.*

19.106 For appliances incorporating **electrode-type liquid heaters**, *the supply container is filled with a saturated water sodium chloride solution.*

NOTE A solution is saturated when no more salt can be dissolved.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

Delete the last two paragraphs.

Addition:

*The appliance is tested with doors, lids and similar parts in the **maintenance area** placed in the position of normal use.*

*The test is repeated with doors, lids and similar parts in the **maintenance area** placed in the most unfavourable position, however, the appliance is only tilted to an angle of 5°.*

20.2 *Addition:*

*Test probe 18 and test probe 19 of IEC 61032 are only applied in the **user area**.*

*For parts of appliances intended to be installed in areas open to the public, other than **appliances of the supervised type**, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

Covers over moving parts having a kinetic energy exceeding 4 J shall be interlocked so that it is only possible to remove them when the parts are stationary unless they are only removable with the aid of a **tool**.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Addition:*

*In the **user area**, the value of the impact energy is 1,0 J.*

22 Construction

This clause of Part 1 is applicable except as follows.

22.6 *Addition:*

Parts that withstand the aging test of normative Annex AA are not considered to be parts where leakage could occur.

Electrode-type liquid heaters shall be constructed so that any water that could condense on cold surfaces or any liquid that could leak from containers, hoses, couplings and similar parts shall not become a conductive bridge between the equipotential bonding connection of the inflowing and outflowing liquid and the electrodes and circuitry in direct contact with the electrodes. This requirement does not apply to surfaces of the heater that are in contact with liquids during normal use.

For coffee makers, a drain hole that is necessary to comply with the standard shall be at least 5 mm in diameter or 20 mm^2 in area with a width of at least 3 mm. Holes that do not meet these dimensions are considered to be blocked when determining compliance.

Compliance is checked by measurement.

22.7 *Addition:*

Pressure relief devices shall be constructed so that they cannot be rendered inoperative or set to a higher pressure without the aid of a **tool** that is only available to the manufacturer.

For appliances incorporating pressurized systems, compliance is checked by the following test.

All pressure regulating devices are rendered inoperative and the system is filled with water. The pressure is then raised hydraulically until the pressure relief device operates.

*The pressure shall not exceed 1,2 times the **rated pressure** and the appliance shall be fit for further use. The pressure relief device is then rendered inoperative and the pressure again raised until twice the **rated pressure** is attained. The pressure is maintained at this value for 5 min.*

*The system shall not rupture and there shall be no permanent deformation. However, an **intentionally weak part** may rupture after the pressure has attained 1,5 times the **rated pressure** as long as it does not* impair compliance with this standard*. In this case, the weak part is replaced and the test repeated. Rupture shall occur in the same way.*

If fluid cannot circulate freely throughout the pressurized system, separate tests can be carried out on individual parts of the system.

If more than one pressure relief device operates on the same part of the system, they are rendered inoperative together.

This test is not made on refrigerating systems.

The appliance shall then withstand the electric strength test of 16.3.

22.14 *Addition:*

The requirement also applies in the **maintenance area** to parts liable to be touched during **maintenance operations**.

22.33 *Addition:*

Ingredients and products shall not be in direct contact with **live parts** or, for **class II construction**, with **basic insulation**.

This subclause of Part 1 does not apply to **electrode-type liquid heaters**.

22.47 *Addition:*

All pressure regulating devices are rendered inoperative.

22.101 Appliances shall be constructed so that interlocks cannot be rendered inoperative without using an **override key** if they are necessary for compliance with the standard.

Compliance is checked by inspection, by manual test and by applying test probe B of IEC 61032 with a force of 5 N.

For appliances intended to be installed in areas open to the public, other than **appliances of the supervised type***, if the interlock is located in the* **user area***, test probe 18 of IEC 61032 shall be applied with a force of 2.5 N. If the interlock is situated not more than 850 mm above the floor after installation or in normal use, test probe 19 if IEC 61032 shall also be applied with a force of 2,5 N.*

22.102 It shall not be possible to gain access to the **service area** by only using the **access key** for the **maintenance area**.

Compliance is checked by inspection and by manual test.

22.103 Appliances shall be constructed so that scalding by steam is prevented when a lid is opened.

Compliance is checked by inspection and by the tests of Clause 19.

22.104 Appliances shall be constructed so that dispensed products cannot be contaminated by substances such as lubricants and debris.

Compliance is checked by inspection.

22.105 Appliances shall be constructed so that it is not possible to inadvertently open draw-off taps and drain valves or withdraw drain plugs.

Compliance is checked by inspection and by manual test.

Valves that return automatically to the closed position when released, those of the wheel type or those placed in a recess are considered to comply with this requirement.

22.106 Coin boxes and containers for other payment means shall be positioned or protected so that overfilling does not impair compliance with this standard.

Compliance is checked by inspection.

22.107 Appliances intended to be connected to the water mains shall be constructed for a water pressure not less than 0,6 MPa.

Compliance is checked by inspection.

22.108 Appliances shall be protected in such a manner that moisture, grease and products used in the appliance will not accumulate so that **clearance** and **creepage distances** are reduced.

Compliance is checked by inspection.

22.109 Lights indicating a warning against a hazard shall only be coloured red.

Compliance is checked by inspection.

22.110 Appliances having pressurized containers shall be constructed so that the lid cannot be removed until the pressure has been reduced to approximately atmospheric pressure. They shall incorporate a means to release the pressure to a value of approximately atmospheric pressure.

Compliance is checked by the following test.

The appliance is operated as specified in Clause 11 until the pressure regulator operates for the first time.

The appliance is then disconnected from the supply and the pressure allowed to decrease until the pressure is 4 kPa. A force of 100 N is applied to the most unfavourable point where the lid or its handle can be gripped. It shall not be possible to remove the lid.

The internal pressure is then gradually reduced, the force of 100 N being maintained. There shall be no hazardous displacement of the lid when it is released.

This test is not carried out on appliances when the lid is secured by screw clamps or other devices that ensure that the pressure is automatically reduced in a controlled manner before the lid can be removed.

22.111 **Food areas** and **splash areas** shall be cleanable so that all unwanted matter can be removed. If necessary, **food areas** shall be capable of being disinfected.

Compliance is checked by inspection after having operated the appliance as in normal use and then cleaning and disinfecting it in accordance with the ***instructions for maintenance****.*

22.112 **Non-food areas** that are not adequately separated from **food areas** of appliances that dispense food shall be constructed so that the retention of moisture or unwanted matter, and the ingress of vermin, is prevented.

This requirement does not apply to **splash areas** and appliances that dispense food in sealed containers such as cans and bottles.

Compliance is checked by inspection.

22.113 An **espresso coffee maker of the professional type** shall be constructed so that it is not possible to remove the coffee filter by a simple operation while the container is pressurized. This requirement is considered to be met if the coffee filter can only be removed after it has been rotated through an angle of at least 30°.

Compliance is checked by inspection and by manual test.

22.114 For appliances that are controlled by programmable **electronic circuits** that limit the number of heating elements and motors from being energized at the same time, simultaneous activation of any combination of heating elements and motors shall not render the appliance unsafe.

Compliance is checked as follows:

– *the fault/error conditions specified in Table R.1 are applied and evaluated in accordance with the relevant requirements of normative Annex R; or*

– *the appliance is operated under the conditions of Clause 11 while being supplied at **rated voltage**, the programmable **electronic circuits** being modified to allow simultaneous activation of all heaters and motors under their control. Under these conditions, compliance with 19.13 shall not be impaired.*

22.115 The electrodes of an **electrode-type liquid heater** and any conductive part in direct contact with the electrodes shall be enclosed and separated from the supply mains or any other conductive part by at least **double** or **reinforced insulation** rated for the highest **working voltage** applied to the electrodes or any conductive part in direct contact with the electrodes or **rated voltage**, whichever is higher.

The electrodes shall be supplied by an **isolating transformer** to provide **double insulation** or **reinforced insulation**.

Compliance is checked by inspection and the following test.

It shall not be possible to touch the electrodes and or any conductive part in direct contact with the electrodes with the test probe B and, as applicable, test probe 18 of IEC 61032 in accordance with the conditions specified in 8.1.1 except:

– *the inflowing liquid of the heater before the equipotential bonding specified in 22.116, or*

– *the outflowing liquid of the heater after the equipotential bonding specified in 22.116, or*

– *parts of the equipotential bonding specified in 22.116.*

22.116 For **electrode-type liquid heaters**, the liquid shall enter and leave the heater through metal pipes or flow over metal parts that are permanently and reliably connected with each other to achieve an equipotential bonding connection. If separate metal parts are used, they shall not be located in the liquid inlet or outlet of the appliance.

The contact area between the liquid and the metal pipe or metal part for each contact of the equipotential bond shall be at least 10 times the cross-sectional area of the liquid duct passing through the contact.

The **clearance** between the metal pipe or metal part of each contact of the equipotential bonding and any electrode shall be at least 2 times the value of the largest **creepage distance** between any electrode. The **creepage distance** is measured along the surfaces that are in contact with the liquid during normal use.

Compliance is checked by inspection and the following test.

The low-frequency resistance RLF of the equipotential bond is measured by passing a current between the parts providing the contact to the liquid. The current is derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to 1,5 times the current applied to the electrodes when operated under the most unfavourable setting for normal use. The test is carried out until steady conditions have been established. The voltage drop across the connection is measured and the resistance is calculated from the current and this voltage drop. The resistance shall not exceed 0,1 Ω.

*If frequencies above 30 kHz are involved, the high-frequency resistance RHF is evaluated at the maximum frequency of the **working voltage** applied to the electrodes according to IEC 60287-1-1:2023, 5.1, with RLF as the DC resistance R´ and only considering the skin effect factor y_s of IEC 60287-1-1:2023, 5.1.3. The resistance shall not exceed 0,25 Ω.*

The equipotential bond is then subjected again to a current derived from a source having a no-load voltage not exceeding 12 V (AC or DC) and equal to the current I_{HF} calculated from the formula:

$$I_{HF} = I_{LF}\sqrt{\frac{R_{HF}}{R_{LF}}}$$

where

I_{HF} *is the current to be applied;*

I_{LF} *is the current applied to measure the low-frequency resistance R_{LF};*

R_{LF} *is the low frequency resistance;*

R_{HF} *is the high-frequency resistance.*

The test is carried out until steady conditions have been established.

22.117 Electrode-type liquid heaters shall be constructed so that there is adequate protection against an electric shock when the inflowing and outflowing liquid of the heater is touched simultaneously.

Compliance is checked by the following tests.

The equipotential bonding connection between the inflowing and outflowing liquid is removed before the test is carried out.

*The appliance is operated with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

The current is measured between the metal pipes or metal parts of the equipotential bonding connection between the inflowing and outflowing liquid.

The current is measured between the neutral of the supply mains and:

- *the inlet guard while the outlet guard is connected to the neutral of the supply mains;*
- *the outlet guard while the inlet guard is connected to the neutral of the supply mains.*

For a single-phase appliance, the measuring circuit is shown in Figure 105.

For a three-phase appliance, the measuring circuit is shown in Figure 106.

For three-phase appliances with neutral (3N~) the current is measured with the switches a, b and c in the closed position. The measurements are then repeated with each of the switches a, b and c open in turn, the other two switches remaining closed.

The current is measured by means of the circuit described in IEC 60990:2016, Figure 4. However, if frequencies above 30 kHz are involved, measurement of the current shall include measurement with regard to electric burn effects. For burn effects, the unweighted RMS value

of the current is relevant. The unweighted current is calculated from the RMS voltage U_1, which is measured across the 500 Ω resistor of IEC 60990:2016, Figure 4. The unweighted current shall not exceed 10 mA.

During the test, the current shall not exceed the applicable limits specified in 13.2.

NOTE The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity.

22.118 Electrode-type liquid heaters shall not produce hydrogen gas in hazardous amounts and the construction supporting the electrodes shall be constructed such that gas does not accumulate within the appliance during normal use.

Compliance is checked by inspection and the following test.

*The appliance is operated for one cycle under conditions of **normal operation** with the most unfavourable setting for normal use and the supply container of each heater is filled with water having a conductivity in the range of **normal operation** to cause the most unfavourable results.*

*The concentration of hydrogen gas is measured as close as possible to each liquid outlet of the appliance connected to an **electrode-type liquid heater**.*

The concentration of hydrogen gas in the relevant area is measured continuously from the beginning of the test until the end of the cycle. The background hydrogen concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The measured value shall not exceed 50 % of the lower flammability limit (LFL) of hydrogen.

NOTE 1 The most unfavourable conductivity can be obtained by starting the test with water having the lowest conductivity for **normal operation** and gradually increase the conductivity.

NOTE 2 The *LFL* of hydrogen gas is 4 %V/V of air.

The instrument used for monitoring gas concentration, such as those which use infrared sensing techniques, shall have a fast response of not more than 3 s and shall not unduly influence the result of the test.

If gas chromatography is to be used, the gas sampling in confined areas shall occur at a rate not exceeding 2 ml every 30 s.

NOTE 3 Other instruments can be used provided that they do not unduly influence the results.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Addition:*

The requirement also applies to **maintenance operations**.

Modification:

Replace the last sentence of the penultimate paragraph with the following:

The number of flexings is

– *200 000, for conductors flexed during normal use;*

– *10 000, for conductors flexed during **maintenance operations**.*

23.101 Anchorages for internal wiring that can easily be replaced shall be constructed and located so that

– the wiring cannot touch the clamping screws of the anchorage if these screws are accessible, unless they are separated from **accessible metal parts** by **supplementary insulation**;

– the wiring is not clamped by a metal screw that bears directly on the wiring;

– for **class I appliances**, the anchorages are of insulating material or are provided with an insulating lining, unless failure of the insulation of the wiring does not make **accessible metal parts** live;

– for **class II appliances**, the anchorages are of insulating material, or if of metal, they are insulated from **accessible metal parts** by **supplementary insulation**.

Compliance is checked by inspection.

23.102 Internal wiring that is accessible in the **maintenance area** and is moved during **normal operation** shall comply with 25.13, 25.14, 25.15 and 25.21.

Compliance is checked by the relevant tests.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.2 *Addition:*

*The relevant standard for **isolating transformers** is IEC 61558-2-4. If they have to be tested, they are tested in accordance with normative Annex BB.*

24.1.5 *Addition:*

*For appliance couplers incorporating **thermostats**, **thermal cut-outs** or fuses in the connector, IEC 60320-1:2021 is applicable except that*

– *the earthing contact of the connector is allowed to be accessible, provided that this contact cannot be gripped during insertion or withdrawal of the connector;*

– *the temperature required for the test of Clause 18 is that measured on the pins of the appliance inlet during the heating test of Clause 11 of this standard;*

– *the breaking-capacity test of Clause 19 is carried out using the inlet of the appliance;*

– *the temperature rise of current-carrying parts specified in Clause 21 is not determined.*

Thermal controls are not allowed in connectors complying with the standard sheets of IEC 60320-3.

24.2 *Addition:*

Switches and automatic controls operating at **safety extra-low voltage** may be fitted in **interconnection cords** in the **maintenance area**.

24.101 Connecting devices of **interconnection cords** shall be identified if they are interchangeable with other connecting means in the appliance and connection to the wrong connecting means could impair compliance with the standard.

NOTE Colour coding can be used for identification.

Compliance is checked by inspection.

24.102 Interlock switches shall comply with IEC 61058-1 as far as is reasonable and shall ensure **all-pole disconnection**. However, single-pole disconnection is allowed for protection against risk of mechanical injury.

Compliance is checked by testing the switch in accordance with the relevant clauses of IEC 61058-1:2016, the number of cycles of operation for the test of Clause 17 being 10 000. However, if the switch is operated once per delivery, the number of cycles of operation is 100 000. This requirement only applies to interlock switches necessary for compliance with this standard.

24.103 Thermal cut-outs incorporated for compliance with Clause 19 shall not be **self-resetting thermal cut-outs**. **Thermal cut-outs** shall

– have a trip-free mechanism if they disconnect heating elements and if they disconnect motors, the unexpected starting of which can cause a risk of mechanical injury to the user or **maintenance person**; or
– be located in a **service area**.

Compliance is checked by inspection and by manual test.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable as follows.

25.7 *Addition:*

Supply cords of appliances intended for outdoor use shall be polychloroprene sheathed and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

25.15 *Addition:*

When the test is carried out on internal wiring, the pull force is 30 N and the torque 0,1 Nm, irrespective of the mass of the appliance.

For internal wiring, a push force of 30 N is applied when pushing the wiring into the appliance.

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.

27.1 *Addition:*

For **electrode-type liquid heaters**, the electrodes and the circuitry in direct contact with the electrodes shall not be earthed. This requirement does not apply to parts of the equipotential bonding connection between the inflowing and outflowing liquid specified in 22.116.

27.2 *Addition:*

Stationary class I appliances of the professional type intended to be installed in kitchens shall incorporate a terminal for the connection of an external equipotential bonding conductor. This terminal shall be connected to all **accessible metal parts** of the appliance and shall allow the connection of a conductor having a nominal cross-sectional area of 2,5 mm^2 to 10 mm^2. It shall be located so that the conductor can be connected after installation of the appliance. This requirement does not apply to small fixed exposed metal parts such as nameplates and similar parts.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.1 *Addition:*

The requirement also applies to screws that are removed during **maintenance operations**.

*The test also applies to screws that are tightened during **maintenance operations**.*

28.3 *Addition:*

The requirement also applies to screws operated by the **maintenance person**.

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 unless the insulation is enclosed or located so that it is unlikely to be exposed to pollution during normal use of the appliance due to

– condensation produced by the appliance;
– the use of liquids and solids, such as ingredients, products or cleaning agents.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

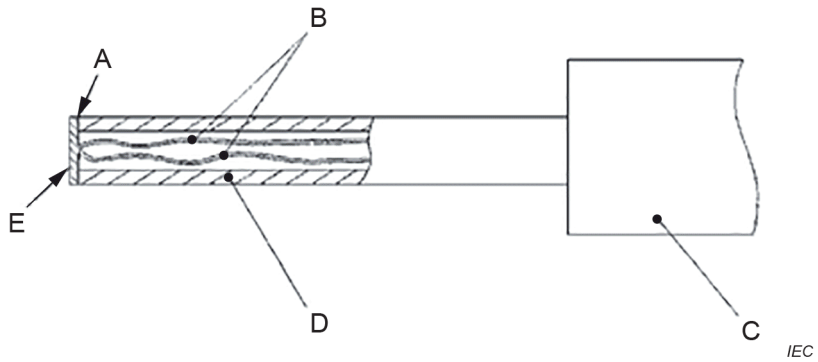
30.2.2 Not applicable.

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

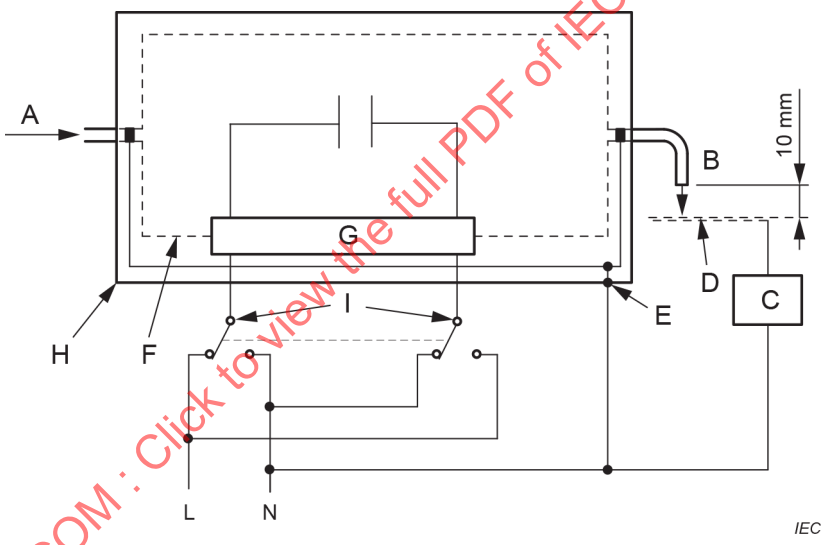
B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

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 a flat contact face

Figure 101 – Probe for measuring surface temperatures



Key

A liquid inlet and associated tube

B liquid outlet and associated tube

C circuit of IEC 60990:2016, Figure 4

D metal sieve

E earthing terminal

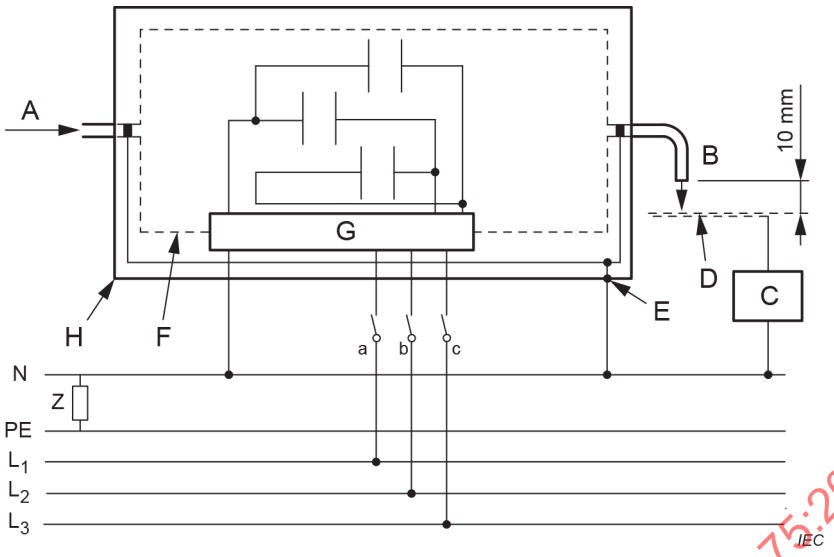
F body of the **electrode-type liquid heater**

G separation means

H body of the appliance

I selector switch

Figure 102 – Circuit diagram for leakage current at operating temperature for single-phase electrode-type liquid heater with the equipotential bond connected to earth



Key

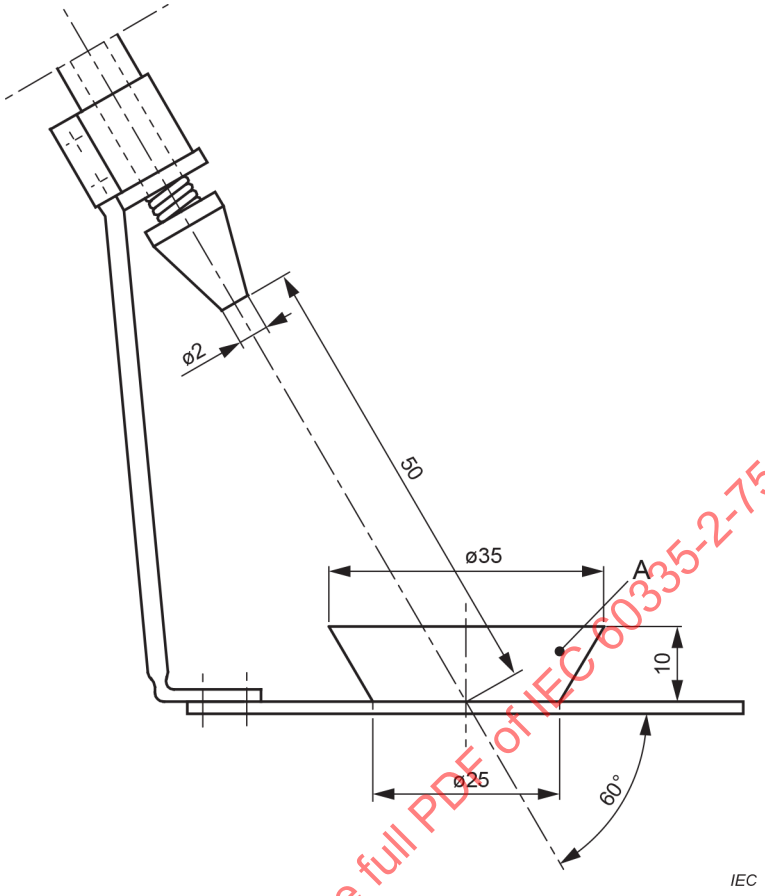
A	liquid inlet and associated tube
B	liquid outlet and associated tube
C	circuit of 60990:2016, Figure 4
D	metal sieve
E	earthing terminal
F	body of the **electrode-type liquid heater**
G	separation means
H	body of the appliance

Connections and supplies

L_1, L_2, L_3, N	supply voltage with neutral
PE	protective earth conductor
Z	IT system neutral to earth high impedance

Figure 103 – Circuit diagram for leakage current at operating temperature for three-phase electrode-type liquid heater with the equipotential bond connected to earth

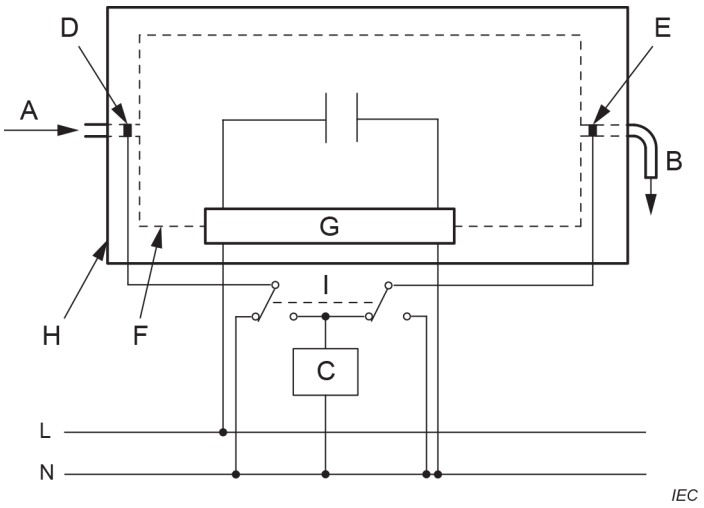
Dimensions in millimetres



Key

A bowl

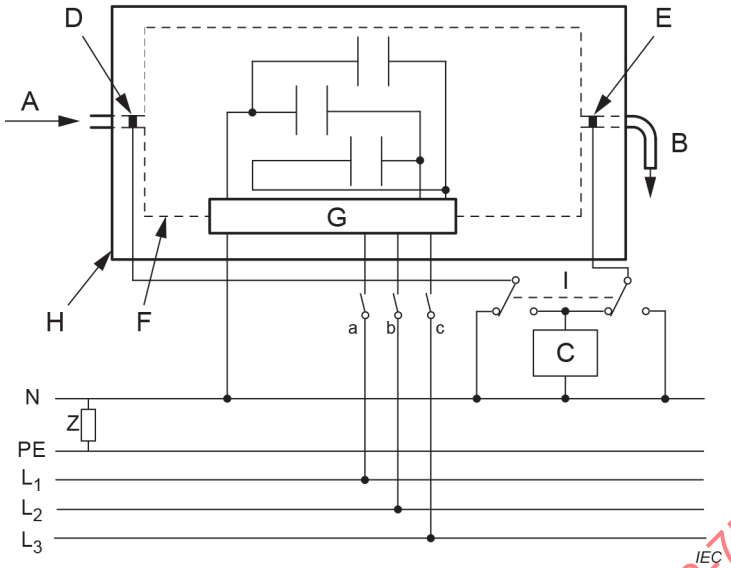
Figure 104 – Splash apparatus



Key

A liquid inlet and associated tube
B liquid outlet and associated tube
C circuit of IEC 60990:2016, Figure 4
D inlet guard
E outlet guard
F body of the **electrode-type liquid heater**
G separation means
H body of the appliance
I selector switch

Figure 105 – Circuit diagram for single-phase electrode-type liquid heater in 22.117



Key

A	liquid inlet and associated tube
B	liquid outlet and associated tube
C	circuit of IEC 60990:2016, Figure 4
D	inlet guard
E	outlet guard
F	body of the **electrode-type liquid heater**
G	separation means
H	body of the appliance
I	selector switch

Connections and supplies

L_1, L_2, L_3, N	supply voltage with neutral
PE	protective earth conductor
Z	IT system neutral to earth high impedance

Figure 106 – Circuit diagram for three-phase electrode-type liquid heater in 22.117

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

Annex B of Part 1 is applicable except as follows:

B.22.3 *Addition:*

Test probe 18 and test proble 19 of IEC 61032 are only applied in the ***user area****.*

For parts of appliances intended to be installed in areas open to the public, other than ***appliances of the supervised type****, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

B.22.4 *Addition:*

Test probe 18 and test proble 19 of IEC 61032 are only applied in the ***user area****.*

For parts of appliances intended to be installed in areas open to the public, other than ***appliances of the supervised type****, situated not more than 850 mm above the floor after installation or in normal use, in addition to the use of test probe 18, test probe 19 of IEC 61032 is also applied wherever test probe 18 is used and with the same test conditions used for test probe 18.*

Annex R
(normative)

Software evaluation

Annex R of Part 1 is applicable except as follows:

R.2.2.5 *Modification:*

Replace the first paragraph with the following:

For programmable **electronic circuits** with functions requiring software incorporating measures to control the fault/error conditions specified in Table R.1, detection or a fault/error shall occur before compliance with Clause 19 or 22.114 is impaired.

R.2.2.9 *Modification:*

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

The software and safety-related hardware under its control shall be initialized and shall terminate before compliance with Clause 19 or 22.114 is impaired.

Annex AA
(normative)

Aging test for elastomeric parts

The aging test on elastomeric parts is carried out by measuring their hardness and mass before and after immersion in water at elevated temperature.

The test is carried out on at least three samples of each part. The samples and test procedure are as specified in ISO 1817:2022 with the following modifications.

6 Test liquids

The test is carried out with water.

Care is taken to ensure that the total mass of the test pieces immersed does not exceed 100 g for each litre of water, that the test pieces are completely immersed and that their entire surface is freely exposed to the water. During the tests, the test pieces are not exposed to direct light. Test pieces of different compounds are not immersed at the same time in the same solution.

7 Test pieces

7.4 Conditioning

The temperature is 23 °C ± 2 °C and the relative humidity is (50 ± 5) %.

8 Immersion in the test liquid

8.1 Temperature

The water is heated within 1 h with the test pieces immersed, to a temperature of 75 $^{+5}_{0}$ °C and maintained at this value. Water at the same temperature is added to compensate for evaporation.

8.2 Duration

The test pieces are immersed for a total period of 48 $^{+1}_{0}$ h.

The test pieces are then immediately immersed in fresh water that is maintained at ambient temperature. The pieces are immersed for 45 min ± 15 min.

After removal from the water, the test pieces are dried with blotting paper.

9 Procedure

9.3 Change in mass

The increase in mass of the test pieces shall not exceed 10 % of the value determined before immersion.

9.7 Change in hardness

The micro-test for hardness applies.

The hardness of the test pieces shall not have changed by more than 8 IRHD. Their surface shall not have become sticky and shall show no crack visible to the naked eye or any other deterioration.

Annex BB
(normative)

Isolating transformers

The following modifications to this standard are applicable for **isolating transformers**.

The clause numbers in this annex refer to the clause numbers in the main part of this standard that are modified.

7 Marking and instructions

7.1 Transformers for specific use shall be marked with the:

– name, trademark or identification mark of the manufacturer or responsible vendor;

– model or type reference.

NOTE The definition of transformers for specific use is given in IEC 61558-1:2017.

17 Overload protection of transformers and associated circuits

Fail-safe transformers shall comply with IEC 61558-1:2017, 15.5.

NOTE This test is carried out on three transformers.

22 Construction

IEC 61558-1:2017, 19.1.4.1 and 19.1.4.3 are applicable.

29 Clearances, creepage distances and solid insulation

Instead of 29.1 to 29.3, compliance is checked by the following:

The distances specified in IEC 61558-1:2017, Table 20, Table 21 and Table 22 apply.

*For insulated winding wires complying with IEC 61558-1:2017, 19.12.3, there are no requirements for **clearances** or **creepage distances**. In addition, for windings providing **reinforced insulation**, the distances specified in IEC 61558-1:2017, Table 20 and Table 21 are not assessed.*

*For **isolating transformers** subjected to periodic voltages with frequency exceeding 30 kHz, the **clearances**, **creepage distances** and **solid insulation** values specified in IEC 60664-4:2005 are applicable, if these values are greater than the values specified in IEC 61558-1:2017, Table 20, Table 21 and Table 22.*

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-47, *Household and similar electrical appliances – Safety – Part 2-47: Particular requirements for commercial electric boiling pans*

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

IEC 60335-2-82, *Household and similar electrical appliances – Safety – Part 2-82: Particular requirements for amusement machines and personal service machines*

IEC 60335-2-89, *Household and similar electrical appliances – Safety – Part 2-89: Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor*

IEC 60335-2-90, *Household and similar electrical appliances – Safety – Part 2-90: Particular requirements for commercial microwave ovens*

IEC 60335-2-118, *Household and similar electrical appliances – Safety – Part 2-118: Particular requirements for professional ice-cream makers*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

_____

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – SÉCURITÉ –

Partie 2-75: Exigences particulières pour les distributeurs commerciaux avec ou sans moyen de paiement

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
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'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de brevet revendiqué à cet égard. À la date de publication du présent document, l'IEC avait reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Toutefois, il y a lieu d'avertir les responsables de la mise en application du présent document que des informations plus récentes sont susceptibles de figurer dans la base de données de brevets, disponible à l'adresse https://patents.iec.ch. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 60335-2-75 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 quatrième édition annule et remplace la troisième édition parue en 2012, l'Amendement 1:2015 et l'Amendement 2:2018. 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) certaines notes ont été converties en texte normatif (Article 1, 7.1, 19.2, 19.101);

c) ajout d'exigences pour les appareils de chauffage des liquides du type à électrodes (Article 1, 3.1.9, 3.6.101, 3.7.103, 13.2, 13.3, 16.2, 16.3, 19.1, 19.103 à 19.106, 22.6, 22.33, 22.115 à 22.118, 24.1.2, 27.1, Annexe BB);

d) ajout d'exigences d'essai pour les appareils dont la température ambiante recommandée est supérieure à 25 °C (5.7);

e) application des calibres d'essai 18 et 19 (8.1.1, 20.2, 22.101, B.22.3, B.22.4);

f) ajout de limites de température pour les surfaces accessibles, y compris le marquage des surfaces chaudes (7.1, 7.6, 7.12, 7.14, 7.15, 11.3, 11.8);

g) ajout d'exigences pour empêcher le fonctionnement simultané de plusieurs charges (22.114, Annexe R);

h) clarification des exigences applicables aux coupe-circuit thermiques situés dans une zone de service (24.103).

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

Projet	Rapport de vote
61/7301/FDIS	61/7344/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/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 distributeurs commerciaux avec ou sans moyen de paiement.

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

NOTE 2 Le système de numérotation suivant est utilisé:

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

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

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

NOTE 3 Les caractères d'imprimerie suivants sont utilisés:

– exigences: caractères romains;

– *modalités d'essais: caractères italiques;*

– notes: petits caractères romains.

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

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

- reconduit,
- supprimé, ou
- révisé.

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

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

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

– 6.1: la classe 0I est admise pour les appareils utilisés à l'intérieur dont la tension assignée ne dépasse pas 150 V (Japon).

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

– 16.2: les limites de courant de fuite sont différentes (Japon).

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

Un appareil utilisant des matériaux ou présentant des modes de construction différents de ceux décrits dans les exigences de 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 2-75: Exigences particulières pour les distributeurs commerciaux avec ou sans moyen de paiement

1 Domaine d'application

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

La présente partie de l'IEC 60335 traite de la sécurité des **distributeurs** commerciaux électriques **avec** ou sans **moyen de paiement**, destinés à la préparation et à la distribution d'aliments, de boissons et de produit de consommation, dont la **tension assignée** est inférieure ou égale à 250 V pour les appareils monophasés et à 480 V pour les autres appareils, **y compris les appareils alimentés en courant continu et les appareils alimentés par batteries**.

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

– les machines à thé ou à café en vrac;
– les **distributeurs avec moyen de paiement** de cigarettes;
– les moulins à café destinés à être utilisés dans des lieux ouverts au public;
– les appareils de chauffage des liquides à usage commercial;
– les cafetières avec ou sans moulin à café intégré;
– les cafetières avec système réfrigérant;
– les **distributeurs avec moyen de paiement** de boissons chaudes ou froides;
– les **distributeurs** d'eau chaude;
– les **distributeurs** de crème glacée ou de crème fouettée;
– les **distributeurs** de glace;
– les **distributeurs avec moyen de paiement** de journaux, de bandes ou disques audio ou vidéo;
– les **distributeurs avec moyen de paiement** de boissons et de nourriture sous emballage;
– les présentoirs réfrigérés;
– les appareils qui comportent des **appareils de chauffage des liquides du type à électrodes**.

Les appareils peuvent avoir plusieurs fonctions.

D'autres normes peuvent s'appliquer pour certaines fonctions telles que:

– la réfrigération (IEC 60335-2-89);
– le chauffage par micro-ondes (IEC 60335-2-90);
– les fabriques de crème glacée à usage professionnel (IEC 60335-2-118).

La présente norme traite également des aspects liés à hygiène de ces appareils.

Dans la mesure du possible, la présente norme traite des dangers ordinaires présentés par les appareils, encourus par les utilisateurs et les **agents d'entretien**. Cependant, elle ne tient pas compte en général de l'utilisation des appareils comme jouet par des jeunes enfants.

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 pour les appareils qui comportent des récipients sous pression;
– dans de nombreux pays, des exigences supplémentaires sont spécifiées par les organismes nationaux de la santé, par les organismes nationaux responsables de la protection des travailleurs, par les organismes nationaux responsables de l'alimentation en eau et par des organismes similaires.

La présente norme ne s'applique pas:

– aux appareils prévus exclusivement pour des usages domestiques;
– 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 moulins à café à usage commercial destinés à être utilisés dans des lieux non ouverts au public (IEC 60335-2-64);
– aux marmites électriques à usage commercial (IEC 60335-2-47);
– aux bains-marie électriques à usage commercial (IEC 60335-2-50);
– aux machines de service et machines de divertissement (IEC 60335-2-82);
– aux appareils de fabrication de glaces à usage commercial (IEC 60335-2-89);
– aux appareils utilisés uniquement pour distribuer de l'argent;
– aux meubles d'exposition;
– aux exigences pour les distributeurs de **denrées alimentaires potentiellement dangereuses** (celles-ci sont couvertes par des réglementations sanitaires nationales dans de nombreux pays).

2 Références normatives

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

Addition:

IEC 60287-1-1:2023, *Câbles électriques – Calcul du courant admissible – Partie 1-1: Équations de l'intensité du courant admissible (facteur de charge 100 %) et calcul des pertes – Généralités*

IEC 60320-1:2021, *Connecteurs pour usages domestiques et usages généraux analogues – Partie 1: Exigences générales*

IEC 60335-2-34:2021, *Appareils électrodomestiques et analogues – Sécurité – Partie 2-34: Exigences particulières pour les motocompresseurs*

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

IEC 61558-2-4, *Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et combinaisons de ces éléments – Partie 2-4: Exigences particulières et essais pour les transformateurs de séparation des circuits et les blocs d'alimentation incorporant des transformateurs de séparation des circuits pour applications d'ordre général*

ISO 1817:2022, *Caoutchouc vulcanisé ou thermoplastique – Détermination de l'action des liquides*

3 Termes et définitions

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

3.1 Définitions relatives aux caractéristiques physiques

3.1.9 *Modification:*
conditions de fonctionnement normal

Remplacer le premier alinéa par ce qui suit:

fonctionnement de l'appareil dans les conditions suivantes:

L'appareil est mis en fonctionnement en **mode prêt** jusqu'à l'établissement des conditions de régime, puis suivant la procédure de distribution la plus défavorable. L'appareil est réapprovisionné, lorsque cela est nécessaire, conformément aux instructions d'emploi ou aux **instructions d'entretien**, et la période de fonctionnement suivante est commencée immédiatement.

Les couvercles des **appareils de type professionnel** et des **appareils de type surveillé** sont placés dans la position pour laquelle ils sont prévus.

Les cafetières sont mises en fonctionnement avec leur réservoir rempli jusqu'à leur **capacité assignée** d'eau ou reliées au réseau d'alimentation en eau, le cas échéant. Les cafetières qui comportent une surface chauffée destinée à maintenir un liquide au chaud sont mises en fonctionnement avec ou sans réservoir, si cette condition est la plus défavorable.

Pour les appareils qui comportent des **appareils de chauffage des liquides du type à électrodes**, chaque **appareil de chauffage des liquides du type à électrodes** est alimenté à partir d'un réservoir rempli d'eau dont la conductivité se situe dans la plage de conductivités assignée à l'appareil de chauffage par le fabricant. Sauf spécification contraire, les réservoirs d'alimentation sont remplis d'eau dont la conductivité est égale à la limite supérieure de la plage de conductivités assignée à une température de 15 °C ± 5 °C.

Note 1 à l'article: La conductivité appropriée peut être obtenue en ajoutant à l'eau du chlorure de sodium.

3.1.101
pression assignée
pression attribuée aux parties sous pression de l'appareil par le fabricant

3.5 Définitions relatives aux types d'appareils

3.5.101
distributeur
appareil destiné à fournir ou mettre à disposition des aliments, des boissons et d'autres produits de consommation

Note 1 à l'article: L'appareil peut également préparer les produits.

Note 2 à l'article: L'opération de distribution peut être déclenchée manuellement ou par des moyens tels que des pièces ou des cartes de crédit.

3.5.102
distributeur avec moyen de paiement
distributeur actionné par des pièces, des cartes de crédit ou d'autres moyens de paiement

3.5.103
appareil de type professionnel
distributeur destiné à être utilisé uniquement par des personnes formées telles que du personnel de bar ou de cuisine

3.5.104
appareil de type surveillé
distributeur destiné à être entretenu par des personnes formées, mais qui peut être utilisé par d'autres personnes dans un emplacement où son utilisation est surveillée

Note 1 à l'article: Les salles à manger des restaurants sont des exemples de tels emplacements.

3.5.105
cafetière expresso
cafetière dans laquelle l'eau est chauffée et passe de force à travers le café moulu sous l'effet de la pression de la vapeur ou au moyen d'une pompe

Note 1 à l'article: Les **cafetières expresso** peuvent être équipées d'une sortie pour fournir de la vapeur ou de l'eau chaude.

3.6 Définitions relatives aux parties d'un appareil

3.6.2 *Remplacement:*
partie amovible
partie qui peut être enlevée sans l'aide d'un **outil**, partie qui est enlevée conformément aux instructions d'emploi ou aux **instructions d'entretien**, même si un **outil** ou une **clé d'accès** est nécessaire pour l'enlever, ou partie qui ne satisfait pas à l'essai du 22.11

Note 1 à l'article: Si, pour effectuer l'installation, une partie doit être enlevée, cette partie n'est pas considérée comme étant amovible, même si les instructions indiquent qu'elle doit être enlevée.

Note 2 à l'article: Une partie qui peut être ouverte est considérée comme une partie qui peut être enlevée.

3.6.101
appareil de chauffage des liquides du type à électrodes
appareil de chauffage des liquides dans lequel un liquide conducteur est chauffé par un courant qui le traverse

3.6.102
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 ou la plaque chauffante d'une machine à café constitue un exemple.

3.7 Définitions relatives aux composants de sécurité

3.7.3 *Remplacement:*
coupe-circuit thermique
dispositif qui, en fonctionnement anormal, limite la température de la partie commandée par l'ouverture automatique du circuit ou par réduction du courant, et qui est construit de façon telle que son réglage ne puisse pas être modifié par l'utilisateur ou par l'**agent d'entretien**

3.7.101
clé d'accès
clé ou autre moyen qui donne accès à la **zone d'entretien**, mais qui ne donne pas accès à la **zone de service**

Note 1 à l'article: Un **outil** ou un fonctionnement par codes ou signaux produits par des sources optiques ou électromagnétiques constitue un "autre moyen".

3.7.102
clé de déverrouillage
clé ou autre moyen utilisé pour rendre un verrouillage inopérant

3.7.103
transformateur de séparation
transformateur dont l'enroulement primaire est séparé électriquement de l'enroulement secondaire au moyen d'une isolation au moins équivalente à la **double isolation** ou à **isolation renforcée** et qui est destiné à alimenter un appareil ou un circuit à une tension supérieure à la **très basse tension de sécurité**

3.8 Définitions relatives à des sujets divers

3.8.101
mode prêt
état de l'appareil, mis sous tension et prêt à l'utilisation, rempli comme prévu d'ingrédients ou de produits, les réceptacles à monnaie et les réservoirs destinés au trop-plein étant vides

3.8.102
instructions d'entretien
instructions qui expliquent comment effectuer les **opérations d'entretien** dans la **zone d'entretien**

3.8.103
agent d'entretien
personne qui entretient l'appareil conformément aux **instructions d'entretien**

3.8.104
zone utilisateur
zone dont l'accès est obtenu sans l'utilisation d'une **clé d'accès** ou d'un **outil**

Note 1 à l'article: La **zone utilisateur** des **appareils de type surveillé** est déterminée avec les **parties amovibles** et autres parties mobiles, comme les portes et les couvercles, en place comme en usage normal.

Note 2 à l'article: Les **appareils de type professionnel** ne comportent pas de **zone utilisateur**.

3.8.105
zone d'entretien
zone dont l'accès ne peut être obtenu qu'au moyen d'une **clé d'accès**

3.8.106
zone de service
zone dont l'accès ne peut pas être obtenu au moyen d'une **clé d'accès** uniquement

3.8.107
denrée alimentaire potentiellement dangereuse
denrée alimentaire qui comporte des ingrédients naturels ou synthétiques qui peuvent faciliter le développement rapide et progressif de micro-organismes pathogènes ou qui produisent des toxines

Note 1 à l'article: Le lait, les œufs, la viande, la volaille, les coquillages, les crustacés et leurs produits dérivés, soit sous forme de produits frais soit traités par la chaleur, sont des exemples de **denrées alimentaires potentiellement dangereuses**. Les denrées alimentaires d'origine végétale prêtes pour la consommation sans nécessiter de préparation ou de traitement ultérieur constituent également de tels exemples.

Note 2 à l'article: Des denrées alimentaires peuvent devenir des **denrées alimentaires potentiellement dangereuses** en cours de traitement, par exemple lorsque des ingrédients sous forme de poudre sont mélangés avec de l'eau ou lorsque les denrées alimentaires sont entreposées à des températures incorrectes.

Note 3 à l'article: Les **denrées alimentaires potentiellement dangereuses** n'incluent pas:

– les bonbons, les fruits secs oléagineux, les gommes et les friandises similaires;
– les gâteaux secs, les biscuits et les produits de boulangerie similaires;
– le café instantané, le chocolat, le cacao et le sucre;
– les denrées alimentaires dont le pH est inférieur ou égal à 4,6 ou dont la valeur d'activité aqueuse (Aw) est inférieure ou égale à 0,85 à 25 °C;
– les denrées alimentaires maintenues à une température inférieure ou égale à 5 °C pendant des périodes spécifiées par le producteur, mais non supérieures à 5 jours;
– les denrées alimentaires maintenues à une température supérieure à 65 °C ou inférieure à –18 °C;
– les denrées alimentaires contenues dans des récipients fermés hermétiquement;
– les denrées alimentaires qui ont été traitées pour empêcher leur altération.

3.8.108
opération d'entretien
tout entretien indiqué dans les **instructions d'entretien**, dont l'accomplissement par l'**agent d'entretien** dans la **zone d'entretien** a été prévu

Note 1 à l'article: L'**opération d'entretien** n'inclut pas les opérations effectuées dans la **zone de service**.

Note 2 à l'article: La préparation de l'appareil pour de nouveaux produits ou de nouveaux modes de fonctionnement, le nettoyage, le changement de prix, la recharge, la collecte des pièces de monnaie et le réglage des commandes sont des exemples d'**opérations d'entretien**.

Note 3 à l'article: Les **distributeurs** avec ou sans **moyen de paiement** peuvent posséder des **zones d'entretien** qui ne sont pas accessibles aux utilisateurs. L'entretien spécifique dans ces zones doit être effectué par l'**agent d'entretien**.

3.8.109
zone de denrées alimentaires
zone qui comprend les surfaces en contact avec les aliments, ainsi que les surfaces avec lesquelles les aliments peuvent être en contact pendant la préparation du produit

3.8.110
zone hors denrées alimentaires
zone à l'intérieur de l'appareil, autre qu'une **zone de denrées alimentaires**

3.8.111
zone de projections
zone qui comprend les surfaces sur lesquelles une partie des aliments peut éclabousser ou couler en usage normal, mais de sorte que ces aliments ne se mélangent pas au produit

4 Exigences générales

L'article de la Partie 1 s'applique.

5 Conditions générales d'essais

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

5.2 *Addition:*

Si l'essai du 15.102 doit être réalisé, trois échantillons supplémentaires sont exigés.

Si les essais de l'Annexe BB normative sont effectués, quatre transformateurs supplémentaires sont nécessaires.

5.6 *Addition:*

*Les dispositifs de commande, les dispositifs de coupure ou autres parties de la **zone d'entretien** sont réglés sur la position la plus défavorable dans les limites indiquées dans les **instructions d'entretien**. Les dispositifs de commande ou dispositifs de coupure de la **zone de service** ne sont pas réglés.*

5.7 *Addition:*

Pour les appareils dont la température ambiante recommandée est supérieure à 25 °C, les essais de l'Article 10, de l'Article 11 (à l'exception du 11.101) et de l'Article 13 sont effectués à la température ambiante maximale recommandée $^{+5}_{-0}$ °C.

5.9 *Addition:*

Lorsque des logiciels en option sont prévus par le fabricant de l'appareil, l'appareil est soumis à l'essai avec le logiciel qui donne les résultats les plus défavorables.

5.10 *Addition:*

NOTE 101 Les **clés d'accès** et les **clés de déverrouillage** peuvent être fournies séparément de l'appareil.

Les appareils sont installés selon les instructions fournies avec l'appareil, avant les essais.

Si les instructions indiquent que l'appareil peut être installé avec d'autres appareils, l'incidence de cette combinaison est prise en considération.

5.101 *Les appareils destinés à être reliés au réseau d'alimentation en eau sont alimentés avec de l'eau à la température de 15 °C ± 5 °C et à la pression la plus défavorable spécifiée dans les instructions. Pour les appareils qui sont remplis d'eau à la main, la température de l'eau est de 15 °C ± 5 °C.*

Pour les appareils destinés à refroidir l'eau, la température de l'eau est de 25 °C ± 5 °C.

5.102 *Les exigences de la présente norme pour la **zone d'entretien** s'appliquent lorsque les **instructions d'entretien** sont suivies. Si une **clé d'accès** à la **zone d'entretien** est fournie, celle-ci est utilisée avant l'exécution d'un essai, si cette condition est plus défavorable.*

5.103 *Les **appareils de type professionnel** et les **appareils de type surveillé** sont soumis à l'essai comme des **appareils chauffants**, même s'ils comprennent un moteur. Si ces appareils ne comportent pas d'éléments chauffants, ils sont soumis à l'essai comme des **appareils à moteur**.*

6 Classification

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

6.1 *Modification:*

Remplacer le premier alinéa par ce qui suit:

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

6.2 *Addition:*

Les appareils destinés à être utilisés à l'extérieur doivent être au moins classés IPX4.

Les appareils prévus pour être nettoyés au jet d'eau ou pour être installés dans un endroit où un jet d'eau est susceptible d'être utilisé doivent être au moins classés IPX5.

7 Marquage et instructions

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

7.1 *Addition:*

Les appareils doivent porter les marquages suivants:

– la **pression assignée**, en mégapascals, le cas échéant;
– la pression d'eau maximale admissible, en mégapascals, pour les appareils destinés à être reliés au réseau d'alimentation en eau.

Les appareils destinés à être remplis manuellement doivent comporter un moyen tel qu'une marque de niveau ou un signal sonore ou visuel qui indique que le niveau exigé pour un fonctionnement correct a été atteint.

Les appareils destinés à être immergés partiellement dans l'eau pour le nettoyage doivent porter un marquage, qui indique le niveau maximal d'immersion et qui comporte en substance l'indication suivante:

ne pas immerger au-dessus de ce niveau.

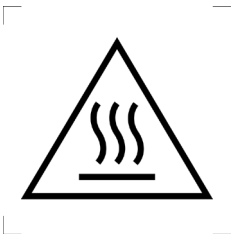
Si un appareil possède des **surfaces accessibles** extérieures, pour lesquelles des limites d'échauffement sont spécifiées dans le Tableau 101 et pour lesquelles les dispositions de la note de bas de tableau b du Tableau 101 ou du Tableau 102 s'appliquent, l'appareil doit porter un marquage sur lequel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

ATTENTION: Surfaces très chaudes.

7.3 *Addition:*

L'exigence s'applique également lorsque le réglage doit être effectué par l'**agent d'entretien**.

7.6 *Addition:*



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

Attention: surface très chaude

7.8 *Addition:*

Les bornes de liaison équipotentielle doivent être repérées par le symbole d'équipotentialité IEC 60417-5021 (2002-10).

Ce symbole ne doit pas être placé sur des vis, des rondelles amovibles ni sur d'autres parties qui peuvent être enlevées lors du raccordement des conducteurs.

7.12 *Addition:*

Les instructions applicables aux appareils qui comportent des **appareils de chauffage des liquides du type à électrodes** doivent spécifier, pour chaque appareil de chauffage:

– les liquides prévus pour être utilisés avec l'appareil de chauffage;
– les conséquences possibles de l'utilisation de liquides autres que les liquides prévus;
– la plage de conductivités pour le **fonctionnement normal**, exprimée par ses limites inférieure et supérieure en mS/cm.

Si le symbole IEC 60417-5041 (2002-10) est marqué sur l'appareil, sa signification doit être expliquée.

7.12.1 *Addition:*

Les instructions d'installation des appareils destinés à être reliés au réseau d'alimentation en eau doivent spécifier les moyens de raccordement et attirer l'attention sur toutes les règles nationales qui peuvent s'appliquer.

Les instructions d'installation doivent indiquer si l'appareil est adapté à une utilisation à l'extérieur.

Les instructions d'installation doivent indiquer les températures ambiantes maximale et minimale pour un fonctionnement correct.

Pour les appareils qui ne sont pas au moins classés IPX5, les instructions d'installation doivent indiquer que l'appareil n'est pas adapté à une installation dans un endroit où un jet d'eau est susceptible d'être utilisé.

Les instructions d'installation doivent indiquer l'inclinaison maximale de l'appareil pour un usage normal. Il n'est pas nécessaire de fournir cette indication si l'inclinaison est inférieure à 2°. Une instruction telle que "l'appareil doit être placé en position horizontale" est suffisante.

Les instructions d'installation des **appareils de type professionnel** doivent indiquer que l'appareil doit être installé uniquement dans des emplacements où son utilisation et son entretien sont strictement réservés à du personnel formé.

Les instructions d'installation des **appareils de type surveillé** doivent indiquer que l'appareil doit être installé uniquement dans des emplacements où il peut être surveillé par du personnel formé. Les instructions d'installation des appareils autres que les **appareils de type professionnel** et les **appareils de type surveillé** doivent indiquer que l'appareil est destiné à être utilisé dans un lieu ouvert au public.

Les instructions d'installation des **appareils de la classe I de type professionnel** destinés à être raccordés de façon permanente aux canalisations fixes et dont le courant de fuite peut dépasser 10 mA doivent conseiller l'installation d'un dispositif à courant différentiel résiduel (DDR) dont le courant différentiel de fonctionnement assigné ne dépasse pas 30 mA.

7.12.101 S'il est nécessaire de prendre des précautions spéciales au cours des **opérations d'entretien**, les détails correspondants doivent être fournis. Les **instructions d'entretien** doivent indiquer la façon d'accéder à la **zone d'entretien** ainsi que la façon d'utiliser la **clé d'accès** et la **clé de déverrouillage**. Elles ne doivent pas comporter d'instructions sur la façon d'accéder à la **zone de service**.

Les **instructions d'entretien** doivent spécifier la méthode et la fréquence de nettoyage. Elles doivent comporter des précisions sur le détartrage, la désinfection, le nettoyage à grande eau, et sur la façon de retirer de l'appareil tous les résidus d'agents d'entretien et d'agents stérilisants et détartrants, le cas échéant. Les agents recommandés pour le nettoyage ou la désinfection doivent être spécifiés et peuvent être identifiés par leur dénomination chimique.

Si l'appareil n'est pas au moins classé IPX5, les **instructions d'entretien** doivent indiquer que l'appareil ne doit pas être nettoyé au jet d'eau.

Les **instructions d'entretien** des appareils qui sont équipés d'un socle de connecteur et qui sont destinés à être partiellement ou complètement immergés dans l'eau pour le nettoyage doivent indiquer que la prise mobile de connecteur doit être débranchée avant de nettoyer l'appareil et que le socle de connecteur doit être séché avant une nouvelle utilisation de l'appareil.

Si l'utilisation d'une **clé de déverrouillage** permet l'accès aux parties mobiles, un avertissement approprié doit être fourni dans les **instructions d'entretien**.

Les **instructions d'entretien** doivent énumérer tous les accessoires qui peuvent être utilisés avec l'appareil.

Les **instructions d'entretien** doivent indiquer les températures ambiantes maximale et minimale pour un fonctionnement correct.

Pour les appareils qui utilisent de l'eau, les **instructions d'entretien** doivent donner des détails sur la façon d'éviter le gel ou sur les mesures à prendre en cas de gel.

Les **instructions d'entretien** des appareils qui contiennent du gaz sous pression doivent comporter des détails sur la manière de manipuler les réservoirs sous pression et le gaz.

Les **instructions d'entretien** doivent spécifier les types de denrées alimentaires pour lesquels l'appareil est approprié et donner des précisions sur la manière d'assurer un fonctionnement qui respecte les conditions d'hygiène.

La vérification est effectuée par examen.

7.12.102 Les instructions doivent indiquer que l'accès à la **zone de service** est strictement réservé aux personnes qui ont la connaissance et l'expérience pratique de l'appareil, en particulier pour ce qui concerne la sécurité et l'hygiène.

La vérification est effectuée par examen.

7.14 *Addition:*

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

7.15 *Addition:*

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**.

8 Protection contre l'accès aux parties actives

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

8.1.1 *Addition:*

*Les calibres d'essai 18 et 19 de l'IEC 61032 ne sont appliqués que dans la **zone utilisateur**.*

*Pour les parties des appareils prévus pour être installés dans des lieux ouverts au public, autres que les **appareils de type surveillé**, situées au maximum à 850 mm au-dessus du sol après installation ou en usage normal, en plus d'utiliser le calibre d'essai 18, le calibre d'essai 19 de l'IEC 61032 est également appliqué chaque fois que le calibre d'essai 18 est utilisé, dans les mêmes conditions d'essai que le calibre d'essai 18.*

9 Démarrage des appareils à moteur

L'article de la Partie 1 ne s'applique pas.

10 Puissance et courant

L'article de la Partie 1 s'applique.

11 Échauffements

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

11.2 *Modification:*

Remplacer le premier tiret du quatrième alinéa par ce qui suit:

– *les appareils prévus pour être fixés à un sol ou une table ainsi que ceux qui ont une masse supérieure à 40 kg et ne sont pas équipés de roulettes ou de roues sont installés conformément aux instructions. En l'absence d'instructions, l'appareil est placé sur un sol ou une table aussi près que possible des parois;*

– *les autres appareils prévus pour être placés sur un sol ou une table sont placés sur un sol ou une table aussi près que possible des parois.*

11.3 *Addition:*

*Lorsque les **surfaces accessibles** extérieures sont suffisamment planes et que l'accès le permet, le calibre d'essai de la Figure 101 est utilisé pour mesurer les échauffements des **surfaces accessibles** extérieures spécifiées dans le Tableau 101 et le Tableau 102. Le calibre est appliqué sur la surface avec une force de 4 N ± 1 N de manière à établir le meilleur contact possible entre le calibre et la surface. Le mesurage est effectué après une durée de contact de 30 s.*

Le calibre peut être maintenu en place à l'aide d'une pince de laboratoire sur statif ou d'un dispositif analogue. Tout instrument de mesure qui donne les mêmes résultats que le calibre peut être utilisé.

11.4 *Addition:*

*Les **appareils chauffants** équipés de **circuits électroniques** qui commandent la puissance d'entrée sont mis en fonctionnement comme des **appareils combinés**.*

*Si les limites d'échauffement sont dépassées dans les appareils qui incorporent des moteurs, des transformateurs ou des **circuits électroniques**, et si la puissance est inférieure à la **puissance assignée**, l'essai est répété en alimentant l'appareil à 1,06 fois la **tension assignée**.*

11.6 *Addition:*

*Les **appareils combinés** sans dispositifs de commande de puissance électroniques sont mis en fonctionnement comme des **appareils chauffants**.*

11.7 *Addition:*

*L'appareil est mis en fonctionnement dans les **conditions de fonctionnement normal** jusqu'à l'établissement des conditions de régime, l'appareil étant réapprovisionné lorsque cela est nécessaire.*

NOTE 101 Le réapprovisionnement peut exiger l'utilisation d'une **clé d'accès**.

11.8 *Addition:*

*Pendant l'essai, les échauffements des **surfaces accessibles** extérieures des **appareils de type professionnel** et des **surfaces accessibles** extérieures de la **zone d'entretien** de tous les appareils ne doivent pas dépasser les valeurs indiquées dans le Tableau 101.*

*Les échauffements des **surfaces accessibles** extérieures dans la **zone utilisateur** ne doivent pas dépasser les valeurs indiquées dans le Tableau 102.*

L'échauffement des poignées ou des manettes des évents et obturateurs d'air ne doit pas dépasser la valeur spécifiée dans le Tableau 3 pour les surfaces des poignées, boutons, manettes et parties analogues qui ne sont tenus que pendant de courtes périodes en usage normal.

*Les limites d'échauffement des moteurs, des transformateurs et des composants des **circuits électroniques**, y compris les parties directement influencées par ceux-ci, peuvent être dépassées lorsque l'appareil est mis en fonctionnement à 1,15 fois la **puissance assignée**.*

Tableau 101 – Échauffements maximaux pour les surfaces accessibles extérieures spécifiées des appareils de type professionnel et de la zone d'entretien de tous les appareils en conditions de fonctionnement normal

Surface	*Échauffement des surfaces accessibles extérieures* [a, b]
	K
Métal nu	*48*
Métal recouvert [c]	*59*
Verre et céramique	*65*
Plastique et revêtement plastique > 0,4 mm [d, e]	*74*

NOTE Les limites d'échauffement des poignées, boutons, manettes, claviers, pavés numériques et parties analogues sont spécifiées dans le Tableau 3.

[a] *Les échauffements ne sont pas mesurés sur:*

- *la face inférieure des appareils destinés à être utilisés sur un plan de travail ou sur le sol, lorsque ces surfaces sont inaccessibles par un calibre de 75 mm de diamètre et à extrémité hémisphérique;*
- *la surface arrière des appareils qui, selon les instructions, doivent être placés contre une paroi et lorsque ces surfaces sont inaccessibles par un calibre de 75 mm de diamètre et à extrémité hémisphérique;*
- *les **surfaces fonctionnelles** et les surfaces situées à moins de 25 mm de la **surface fonctionnelle**;*
- *les raccords, les flexibles, les vannes et les jauges visuelles d'alimentation en eau chaude;*
- *les couvercles placés au-dessus des espaces chauffés des **appareils chauffants** et **appareils combinés**;*
- *les raccords et les flexibles qui acheminent de l'eau chaude/de la vapeur/du café/du thé et des liquides analogues;*
- *les récipients qui contiennent des liquides chauds et qui deviennent chauds par conduction par une partie chauffée de l'appareil ou par contact avec les liquides chaud (par exemple, verseuses des cafetières de type percolateur et bouilloires).*

[b] *Pour les **appareils chauffants** et **appareils combinés**, l'échauffement des **surfaces accessibles** extérieures peut dépasser les limites de 25 K au maximum, mais la partie concernée doit alors comporter le symbole IEC 60417-5041 (2002-10) ou le texte équivalent.*

[c] *Un métal est considéré comme recouvert lorsqu'un revêtement en émail, en poudre ou non constitué majoritairement de plastique d'une épaisseur minimale de 90 µm est utilisé.*

[d] *La limite d'échauffement du plastique s'applique également aux matériaux plastiques dont l'épaisseur de la finition métallique est inférieure à 0,1 mm.*

[e] *Lorsque l'épaisseur du revêtement plastique ne dépasse pas 0,4 mm, les limites d'échauffement du métal recouvert pour le métal sous-jacent s'appliquent ou les limites d'échauffement du matériau en verre ou céramique pour le matériau en verre ou céramique sous-jacent s'appliquent.*

Tableau 102 – Échauffements maximaux pour les surfaces accessibles extérieures spécifiées de la zone utilisateur en conditions de fonctionnement normal

Surface	***Échauffement des surfaces accessibles extérieures*** [a] *K*	
	Appareils et parties situés au maximum à 850 mm du sol après installation	***Appareils et parties situés à plus de 850 mm au-dessus du sol après installation*** [b]
Métal nu	*38*	*42*
Métal recouvert [c]	*42*	*49*
Verre et céramique	*51*	*56*
Plastique et revêtement plastique > 0,4 mm [d, e]	*58*	*62*
NOTE Les limites d'échauffement des poignées, boutons, manettes, claviers, pavés numériques et parties analogues sont spécifiées dans le Tableau 3.		

[a] *Les échauffements ne sont pas mesurés sur:*

- *la face inférieure des appareils destinés à être utilisés sur un plan de travail ou sur le sol, lorsque ces surfaces sont inaccessibles par un calibre de 75 mm de diamètre et à extrémité hémisphérique;*
- *la surface arrière des appareils qui, selon les instructions, doivent être placés contre une paroi et lorsque ces surfaces sont inaccessibles par un calibre de 75 mm de diamètre et à extrémité hémisphérique;*
- *les* ***surfaces fonctionnelles*** *et les surfaces situées à moins de 25 mm de la* ***surface fonctionnelle****;*
- *les raccords, les flexibles, les vannes et les jauges visuelles d'alimentation en eau chaude;*
- *les couvercles placés au-dessus des espaces chauffés des* ***appareils chauffants*** *et* ***appareils combinés****;*
- *les raccords et les flexibles qui acheminent de l'eau chaude/de la vapeur/du café/du thé et des liquides analogues;*
- *les récipients qui contiennent des liquides chauds et qui deviennent chauds par conduction par une partie chauffée de l'appareil ou par contact avec les liquides chaud (par exemple, verseuses des cafetières de type percolateur et bouilloires).*

[b] *Pour les* ***appareils chauffants*** *et* ***appareils combinés****, l'échauffement des* ***surfaces accessibles*** *extérieures peut dépasser les limites de 25 K au maximum, mais la partie concernée doit alors comporter le symbole IEC 60417-5041 (2002-10) ou le texte équivalent.*

[c] *Un métal est considéré comme recouvert lorsqu'un revêtement en émail, en poudre ou non constitué majoritairement de plastique d'une épaisseur minimale de 90 µm est utilisé.*

[d] *La limite d'échauffement du plastique s'applique également aux matériaux plastiques dont l'épaisseur de la finition métallique est inférieure à 0,1 mm.*

[e] *Lorsque l'épaisseur du revêtement plastique ne dépasse pas 0,4 mm, les limites d'échauffement du métal recouvert pour le métal sous-jacent s'appliquent ou les limites d'échauffement du matériau en verre ou céramique pour le matériau en verre ou céramique sous-jacent s'appliquent.*

11.101 *Les appareils qui comportent des équipements de réfrigération dont les motocompresseurs ne sont pas conformes à l'IEC 60335-2-34:2021 y compris son Annexe AA normative sont également soumis à l'essai à une température ambiante de*

- *32 °C pour les appareils destinés aux pays tempérés.*
- *43 °C pour les appareils destinés aux tropicaux.*

Les autres parties de l'appareil sont mises en fonctionnement pour obtenir les conditions les plus défavorables dans le système de réfrigération.

Les échauffements des parties de l'appareil, autres que le motocompresseur, ne sont pas déterminés.

La température des enroulements et de l'enveloppe des motocompresseurs ne doit pas dépasser les valeurs suivantes:

– *140 °C pour les enroulements de motocompresseurs avec isolation synthétique;*
– *130 °C pour les enroulements de motocompresseurs avec isolation cellulosique;*
– *150 °C pour les enveloppes extérieures des motocompresseurs.*

12 Charge des batteries à ions métalliques

L'article de la Partie 1 s'applique.

13 Courant de fuite et rigidité diélectrique à la température de régime

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

13.2 *Modification:*

Dans le huitième alinéa, remplacer les deux derniers tirets par ce qui suit:

– *pour les **appareils de type professionnel fixes de la classe I** destinés à être raccordés de façon permanente aux canalisations fixes,*	*1 mA par kW de **puissance assignée** de l'appareil, sans valeur maximale;*
– *pour les autres **appareils de type professionnel fixes de la classe I**,*	*1 mA par kW de **puissance assignée** de l'appareil, avec une valeur maximale de 10 mA;*
– *pour les autres **appareils chauffants fixes de la classe I**,*	*0,75 mA, ou 0,75 mA par kW de **puissance assignée** avec une valeur maximale de 5 mA, si cette valeur est plus élevée.*

Addition:

*Pour les appareils qui comportent des **appareils de chauffage des liquides du type à électrodes**, le courant de fuite est en outre mesuré entre un pôle quelconque de l'alimentation et la liaison équipotentielle du liquide entrant et sortant. Si des fréquences supérieures à 30 kHz sont utilisées, le mesurage du courant de fuite doit comprendre le mesurage des effets de brûlure électrique. Pour les effets de brûlure, la valeur efficace non pondérée du courant est pertinente. Le courant non pondéré est calculé à partir de la valeur efficace de la tension U_1, qui est mesurée aux bornes de la résistance de 500 Ω de l'IEC 60990:2016, Figure 4. Le courant non pondéré ne doit pas dépasser 10 mA.*

*Pour les appareils qui comportent des **appareils de chauffage des liquides du type à électrodes** qui présentent la liaison équipotentielle spécifiée en 22.116 et sont connectés à la borne de terre à l'intérieur de l'appareil ou au contact de terre du socle de connecteur, le courant entre un tamis métallique placé dans l'eau à 10 mm de l'orifice de sortie de liquide de l'appareil et la borne de terre est mesuré comme cela est représenté à la Figure 102 pour les appareils monophasés et à la Figure 103 pour les appareils triphasés. Pour les appareils triphasés reliés au neutre (3N~), le courant est mesuré avec les interrupteurs a, b et c en position de fermeture. Les mesurages sont alors répétés, les interrupteurs a, b et c étant ouverts successivement, les deux autres interrupteurs restant fermés. Pour les appareils triphasés reliés au neutre (3~), le circuit de mesure de la Figure 103 doit être utilisé selon le cas, mais le conducteur neutre n'est pas raccordé à l'appareil. Le courant ne doit pas dépasser 0,25 mA.*