IEC 60335-2-36

Edition 7.1 2025-02
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

Household and similar electrical appliances – Safety –
Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

IEC 60335-2-36:2021-12+AMD1:2025-02 CSV(en)

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INTERNATIONAL
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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60335-2-36 edition 7.1 contains the seventh edition (2021-12) [documents 61/6377/FDIS and 61/6427/RVD] and its amendment 1 (2025-02) [documents 61/7244/CDV and 61/7349/RVC].

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

IEC 60335-2-36 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This seventh edition cancels and replaces the sixth edition published in 2017. This edition constitutes a technical revision.

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

a) the text has been aligned with IEC 60335-1:2020;
b) some notes have been converted to normative text, modified or deleted (Clause 1, 7.1, 7.15, 11.4, 13.3, 21.101, 22.101, 27.2, 30.101);
c) conciliation of the text of IEC 60335-2-36 with other standards under IEC/TC61/MT32;
d) exclusion of battery-operated appliances and appliances used in areas open to the public (Clause 1);
e) relocation of cleaning instructions from 7.12.1 to 7.12;
f) clarification of the testing procedure in 15.1.1;
g) clarification on the test conditions in 19.1 and 23.3;
h) introduction of 22.110;
i) clarifications in the requirements in 25.3.

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

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

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

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

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

This Part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements.

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 and its amendment 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 may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

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

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electrically operated commercial **cooking and baking ranges**, ovens, **hobs**, **hob elements** and similar appliances, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances including direct current (DC) supplied appliances.

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

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

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

Attention is drawn to the fact that

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

This standard does not apply to

- appliances designed exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
- appliances for continuous mass production of food;
- steam cookers, forced and steam convection ovens (IEC 60335-2-42);
- appliances for keeping food and crockery warm (IEC 60335-2-49);
- commercial microwave ovens (IEC 60335-2-90)~~;~~.
- ~~**battery-operated appliances**.~~

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

ISO 185, *Grey cast irons – Classification*

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

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

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

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

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.4 *Addition:*

Note 101 to entry: The **rated power input** is the sum of the power inputs of all the individual elements in the appliance that can be on at one time; where there are several such combinations possible, that giving the highest power input is used in determining the **rated power input**.

3.1.9 ~~*Replacement:*~~

Modification:

Replace the first paragraph with the following:

operation of the appliance under the following conditions:

Solid **hob elements** are operated with no load and sheathed **hob elements** are operated with a load made of dull black, cold or hot rolled steel, 9 mm to 10 mm thick, that covers not less than 90 % and not more than 100 % of the element surface. The **hob elements** are operated with the controls set to give the temperatures as set out below, the temperature being measured at the geometrical centre or the hottest point of the solid element or load, if the element is unevenly heated.

Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set at the maximum.

Non-induction heating sources beneath a glass-ceramic or similar material are operated with a pan or pans containing initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are of aluminium, of ordinary quality, not brightly polished, with a base

concavity not exceeding 0,1 mm. The pan or pans shall cover the **cooking zone** to the greatest extent possible.

The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

Induction heating sources beneath a glass-ceramic or similar material are operated with the pan or pans recommended by the manufacturer.

If one pan is used, it shall cover as closely as possible, but not less than, the full area of the **cooking zone**. The pan is positioned centrally.

For non-circular **cooking zones**, a combination of the smallest number of pans is chosen to cover as much as possible the area of the **cooking zone**.

The pan or pans in each case are filled with initially cold frying oil to a height of 30 mm ± 5 mm. The controls are set at maximum until the temperature of the oil attains a value of 180 °C and then adjusted to maintain the oil at a temperature of 180 °C ± 15 °C. The oil temperature is measured 10 mm above the centre of the bottom of the vessel.

A further test is made using initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

The condition providing the most unfavourable results (oil or water) is used.

Ovens are operated with no load and with the controls set so that the mean value of the temperature over the thermostat cycle at the geometric centre of the usable space in the interior of the oven is maintained at 240 °C ± 4 °C. Stepped controls are set so that this temperature is 240 °C ± 15 °C. For ovens that are capable of attaining temperatures in excess of 290 °C, the controls are set so that the temperature is 50 °C ± 4 °C below the maximum temperature attainable. For ovens that are unable to attain a temperature of 240 °C, the controls are set at maximum.

Griddle plates are operated with no load and with the controls set so as to give the temperatures set out below, the temperature being measured at the hottest point of each controlled cooking surface. Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set at maximum.

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

3.5 Definitions relating to types of appliances

3.5.101
cooking and baking range
single cooking or baking appliance incorporating one or more ovens together with one or more **hob elements** or **griddle plates** or a combination of these

Note 1 to entry: An appliance incorporating a forced convection oven, steam-convection oven or microwave oven is considered to be an appliance incorporating another appliance (see also 5.102).

3.5.102
hob
appliance consisting of a **hob surface** and one or more **hob elements**

Note 1 to entry: It may be a separate appliance or part of a **cooking and baking range**.

Note 2 to entry: A **hob** may also incorporate a **griddle plate**.

3.6 Definitions relating to parts of an appliance

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

Note 1 to entry: Examples are **hob elements**, **griddle plates** or ovens.

Note 2 to entry: If an oven incorporates more than one heating element or groups of elements that are so controlled that one element or group cannot be switched on while another element or group is energized, each of the elements or groups of elements is to be considered as a separate **heating unit** and tested accordingly.

3.6.102
hob element
heating unit designed to accommodate a vessel or vessels on its upper surface

Note 1 to entry: A **hob element** may consist of an **induction heating source** or a non-induction heating source beneath a surface of glass-ceramic or similar material.

3.6.103
hob surface
horizontal part of the appliance to which the **hob elements** are attached

3.6.104
cooking zone
area marked on a **hob surface** of glass-ceramic or similar material where the vessel is intended to be placed

3.6.105
induction heating source
heating source that operates by inducing eddy currents in a vessel positioned on the **hob element**

3.6.106
griddle plate
heating unit having a cooking surface on which the food is intended to be placed directly

3.6.107
pan detector
device incorporated in a **hob element** that prevents its operation unless a vessel is placed on the **cooking zone**

Note 1 to entry: A **pan detector** is not considered to be a **thermostat** or **protective device**.

3.6.108
functional surface
surface that is intentionally heated by an internal heat source and has to be hot to carry out the function for which the appliance is intended

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

3.6.109
adjacent surface
surface that is adjacent to a **functional surface** and which can become hot through conduction

3.8 Definitions relating to miscellaneous matters

3.8.101
installation wall
special fixed construction containing supply facilities for appliances installed in conjunction with it

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

***Hob elements** that are submitted separately are tested when installed in an appropriate **cooking range**.*

The test of 18.102 may be made on a separate sample.

5.3 *Addition:*

The test of 18.102 is made before the test of Clause 11 unless it is made on a separate sample.

5.10 *Addition:*

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

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

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

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

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

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

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

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

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

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

– the operating frequency or operating frequency range in kilohertz (kHz) of the **induction heating sources**;

– the total power input of all the induction **heating units** that can operate simultaneously, in watts (W) or kilowatts (kW), unless this is indicated in the instructions;

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

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

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

Caution: Magnetic field

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

Caution: Hot surfaces.

7.6 *Addition:*

	[symbol IEC 60417-5140 (2003-04)]	non-ionizing electromagnetic radiation
	[symbol IEC 60417-5041 (2002-10)]	caution, hot surface

7.12 *Addition:*

If the appliance incorporates a **hob surface** of glass-ceramic or similar material that provides the enclosure of **live parts**, the instructions shall include the substance of the following warning:

WARNING: If the surface is cracked, immediately disconnect the appliance or appropriate part of the appliance from the supply.

The instructions for appliances with **hob surfaces** of glass-ceramic or similar material shall state that aluminium foil and plastic vessels are not to be placed on the hot surfaces. They shall also state that these surfaces are not to be used for storage.

The instructions for appliances containing **hob elements** incorporating halogen lamps shall warn the user to avoid looking directly at the lamps when on.

The instructions for appliances containing **hob elements** incorporating **induction heating sources** shall indicate the size of the smallest cooking vessel to be used. They shall also include the substance of the following:

– metallic objects such as kitchen utensils, cutlery etc. shall not be placed on the hob surface within the cooking zones since they could get hot;

– take care when operating the appliance, as rings, watches and similar objects worn by the user could get hot when in close proximity to the hob surface;

– only use vessels of the type and size recommended.

The instructions for appliances incorporating **induction heating sources** shall state that users with heart pacemakers should consult the manufacturer, unless specific details are given.

The instructions for **hobs** with **hob elements** incorporating **pan detectors** shall include the substance of the following:

After use, switch the hob element off by means of its control. Do not rely on the pan detector.

Instructions for **user maintenance**, for example cleaning, shall also be given. They shall include a statement that the appliance is not to be cleaned with a water jet or a steam cleaner.

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

The instructions shall include the substance of the following:

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

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

Modification:

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

7.12.1 *Addition:*

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

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

In addition, for appliances incorporating **induction heating sources**, the instructions shall state that any repairs shall be carried out only by persons trained or recommended by the manufacturer.

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

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

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

7.12.4 *Addition:*

– for appliances incorporating **induction heating sources**, a warning that care be taken to ensure that the splashback and surrounding area are free of metallic surfaces, if this is necessary due to the design of the appliance. The instructions for **built-in appliances** having a separate control panel for several appliances shall state that the control panel is only to be connected to the specified appliances in order to avoid a possible hazard.

7.12.9 Not applicable.

7.14 *Addition:*

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

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

7.15 *Addition:*

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

Modification:

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

7.101 If, during the test of Clause 11, the temperature rise of the side and rear walls of the test corner above the level of the **hob surface** exceeds 65 K or during the test of Clause 19 the temperature rise of the walls above and below the **hob surface** exceeds 125 K, the installation instructions provided by the manufacturer shall include the substance of the following that shall also be included on a permanent label, attached to the appliance.

Where this appliance is to be positioned in close proximity to a wall, partitions, kitchen furniture, decorative finishes, etc., it is recommended that they are made of non-combustible material. If not, that they shall be clad with a suitable non-combustible heat-insulating material.

Compliance is checked by inspection.

7.102 The **cooking zones** of **hob surfaces** of glass-ceramic or similar material shall be clearly identified by appropriate marking, unless they are obvious.

Compliance is checked by inspection.

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

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

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 *Addition:*

Appliances intended to accommodate detachable **hob elements** shall be constructed so that there is adequate protection against accidental contact with **live parts** during insertion or removal of these elements.

8.101 Heating elements that are liable to be touched accidentally by a fork or similar pointed object in normal use shall be so protected that it is not possible to touch their **live parts** with such an object.

Compliance is checked by inserting test probe 12 of IEC 61032 at all points where the probe can enter in the vicinity of live parts.

9 Starting of motor-operated appliances

This clause of Part 1 is applicable except as follows.

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

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

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

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

The tests are carried out three times.

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

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Modification:*

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

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

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

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

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

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

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

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

10.2 *Modification:*

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

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

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

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

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

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

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Addition:*

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

11.3 *Addition:*

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

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

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

11.4 *Replacement:*

The non-induction heating units of the appliance are operated under normal operation at 1,15 times the power input marked (see 7.1).

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

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

*If it is not possible to switch on all heating elements or **induction heating sources** at the same time, the test is made with each of the combinations that the switch arrangement will allow, the highest load possible with each switching arrangement being in circuit.*

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

*In addition, appliances incorporating **induction heating sources** are also operated as above, but with the smallest size of pan as recommended by the manufacturer placed in the most unfavourable position consistent with being able to energize the coil, but within the **cooking zone**. This operating condition is not applied when reference to Clause 11 is made in other subclauses.*

11.7 ~~*Replacement:*~~

Modification:

Replace the first paragraph with the following:

Appliances are operated until steady conditions are established.

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

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

11.8 *Modification:*

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

Addition:

*The limit of 65 K temperature rise for the rear and side test walls, including the part of the test corner that projects in front of the appliance, only applies below the level of the **hob surface**. If this temperature rise limit is exceeded above the **hob surface** then the instructions in 7.101 shall be provided.*

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

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

[a] *Temperature rises are not measured on:*
- *the underside of appliances intended to be used on a working surface or floor;*
- *the rear surface of appliances;*
- *surfaces that are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the area up to 60 mm around a heated cavity door opening;*
- ***functional surfaces*** *and* ***adjacent surfaces****.*

[b] *The temperature rise on external accessible surfaces up to a distance of 100 mm from* ***adjacent surfaces*** *of the appliance (see Figure 102) may exceed the limits by up to 25 K, but the relevant part shall then be marked with symbol IEC 60417-5041 (2002-10) or the equivalent text.*

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

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

[e] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*

12 Charging of metal-ion batteries

This clause of Part 1 is ~~not~~ applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.1 *Modification:*

The appliance is operated under the conditions specified in Clause 11 until the leakage current has reached a steady value or for the duration specified in 11.7, whichever is the shorter period.

If more than one pan is placed on a single cooking zone, they are electrically connected together.

13.2 *Modification:*

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

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

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

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

13.3 *Addition:*

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to earthed metal.*

*A test voltage of 1 000 V is then applied between **live parts** and the pans.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.*

*A test voltage of 3 000 V is then applied between **live parts** and the pans.*

During the test care shall be taken to avoid overstressing other insulation.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 *Addition:*

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

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

For appliances normally used on the floor, the bowl is placed on the floor and is moved around in such a way as to splash the appliance from all directions. During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl. The bowl is not positioned underneath the appliance.

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

Care is taken that the appliance is not hit by the direct jet.

15.1.2 *Modification:*

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

Addition:

*If detailed instructions regarding the cleaning of movable but non-detachable (for example hinged) **hob elements** are given in the instructions, tests on these **hob elements** are carried out with the elements in the horizontal position of normal use.*

15.2 *Addition:*

*Appliances are positioned so that the **hob surface** is horizontal and if the **hob elements** are adjustable separately, their surfaces are also horizontal.*

*A vessel having a diameter equal to or not more than 25 mm smaller than the largest inscribed circle on the **hob element** or **cooking zone** is completely filled with the spillage solution and placed in the most unfavourable position, not overlapping the **hob element** or the **cooking zone**.*

A further quantity of the spillage solution equal to approximately 2 l is poured steadily into the vessel over a period of 1 min.

*The test is made on each **hob element** separately, the tray or other receptacle being emptied each time.*

For appliances incorporating ovens or grills, the spillage test is made by pouring steadily over a period of 1 min approximately 1 l of the spillage solution over the bottom surface of the oven or grilling compartment.

*For appliances incorporating **griddle plates**, approximately 1 l of the spillage solution is poured steadily over a period of 1 min onto the centre of the surface of the **griddle plate**.*

*If controls are mounted in the **hob surface** of the appliance, 1 l of the spillage solution is poured.*

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

Compliance is checked by the following test.

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

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.1 *Addition:*

*For appliances provided with **hob surfaces** of glass-ceramic or similar material, the tests of 16.2 and 16.3 are made with a pan or pans as described in 3.1.9.*

*If more than one pan is placed on a single **cooking zone**, they are electrically connected together.*

16.2 *Modification:*

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

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

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

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

Addition:

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured for each of the cooking zones in turn, only the pan(s) concerned being connected to earthed metal.*

*The leakage current shall not exceed 1 mA per kW of the power input of the **heating unit** being tested.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured between **live parts** and the pan(s) for each of the **cooking zones** in turn, the pan(s) concerned not being connected to earthed metal.*

*In addition, the leakage current is measured between **live parts** and a probe consisting of a flat metal disc 50 mm in diameter. The probe is placed in all positions on the **hob surface** outside the **cooking zones**, the pans remaining in position.*

For each measurement, the leakage current shall not exceed 0,25 mA.

16.3 *Addition:*

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to the earthed metal.*

*A test voltage of 1 250 V is then applied between **live parts** and the pans.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.*

*A test voltage of 3 000 V is then applied between **live parts** and the pans.*

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable except as follows.

18.101 Appliances incorporating **induction heating sources** shall be constructed so that, in normal use, there is no failure that impairs compliance with this standard. The insulation shall not be damaged and connections shall not work loose.

*Compliance is checked by energizing each **induction heating source** 100 000 times by moving the smallest pan recommended by the manufacturer (or an equivalent metallic object) on and off the **hob element** at a rate of six times per minute (5 s for each movement). The test is made at the least favourable voltage as determined in Clause 11.*

18.102 Appliances incorporating surfaces of glass-ceramic or similar material shall withstand thermal stresses liable to occur in normal use.

Compliance is checked by the following test:

*The appliance is operated with all heating sources beneath the glass-ceramic or similar material energized at the same time. Non-induction heating sources are operated with a pan filled with water according to 3.1.9 but placed in the most unfavourable position on the **cooking zone**. **Induction heating sources** are operated with an empty pan.*

*The controls are set at maximum and the appliance is operated for 500 cycles, each cycle comprising 10 min on and 20 min off, the supply being 1,1 times the **rated voltage**. The operation of thermostats or temperature limiters during the test is ignored.*

*Immediately after the last energized period, the pan(s) is (are) removed and the **hob surface** is subjected to a spillage test using $2\ ^{+0,1}_{0}$ l of cold water between 10 °C and 15 °C, poured steadily over the surface for 1 min.*

Fifteen minutes later all excess water is removed from the surface.

After the test, the surface shall not be cracked or broken and the appliance shall withstand the test in 16.3.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Modification:*

Instead of the first paragraph of the test specification, the following applies.

All appliances are subjected to the tests of 19.2 and 19.3.

In addition, appliances provided with a control limiting the temperature during the tests of Clause 11 are subjected to the test of 19.4 and, where applicable, to the test of 19.5.

*Appliances incorporating **PTC heating elements** are also subjected to the test of 19.6.*

Addition:

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

19.2 *Addition:*

***Induction heating sources** beneath a flat surface of glass-ceramic or similar material are operated with a 6 mm thick disc made of grey cast iron Class 250 in accordance with ISO 185. The diameter of the disc shall be in accordance with the pans specified in 3.1.9. For other than flat surfaces (for example a wok) the supplied pan or a pan recommended by the manufacturer shall be used. The disc is placed on the centre of the **cooking zone.** The **induction heating sources** are supplied with a voltage of 0,94 times the **rated voltage**. The maximum concavity of the base of the disc is $0 < C < d/100$ (see Figure 104). The base of the disc shall not be convex.*

Non-induction heating sources beneath a surface of glass-ceramic or similar material are operated without a pan or with an empty pan, whichever is the least favourable condition.

*For all **heating units**, the controls are adjusted to the highest setting.*

***Pan detectors** are rendered inoperative.*

19.3 *Modification:*

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

*If more than one **hob element** with a non-induction heating source is incorporated in an appliance, the supply voltage is that required to provide a power input of 1,15 times the **rated power input** under **normal operation**.*

*The **hob elements** shall not become energized.*

19.4 *Addition:*

***Hob elements** with **induction heating sources** are not energized and appliances incorporating only **induction heating sources** are not tested.*

19.11.2 *Addition:*

*During simulation of the fault conditions, it shall be possible to switch off any energized **hob element**.*

*The fault conditions are also simulated with all **hob elements** switched off, the appliance being supplied at **rated voltage**. If a **pan detector** is incorporated, a suitable vessel is placed on the **cooking zone**.*

*The **hob elements** shall not become energized.*

19.12 *Addition:*

The test is also repeated if, for any of the fault conditions specified in 19.101, the safety of the appliance depends on the operation of a miniature fuse-link complying with IEC 60127.

19.13 *Addition:*

*If the temperature rise of the walls above and below the **hob surface** exceeds 125 K, the requirements of 7.101 apply.*

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

*The electric strength test of **induction heating sources** is carried out immediately after switching off the appliance.*

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

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

NOTE Examples of fault conditions are:

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

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

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.1 *Modification:*

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

20.2 *Modification:*

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

Protective enclosures, guards and similar parts shall be **non-detachable parts** or shall be interlocked and shall have adequate mechanical strength.

20.101 Appliances other than appliances intended to be fixed to the floor shall have adequate stability when the doors are open and subjected to a load.

Compliance is checked by the following tests.

Doors having a horizontal hinge at their lower edge are opened and a weight is gently placed on the surface of the door so that its centre of gravity is vertically over the geometric centre of the door. The contact area of the weight is such that it will cause no damage to the door, and its mass is

– *for appliances normally used on a floor:*
  - *for oven doors: 23 kg or such higher value as, according to the manufacturer's cooking instructions, can be placed in the oven;*
  - *for other doors: 7 kg;*

– *for appliances normally used on a table or similar support and provided with doors having a horizontal hinge at their lower edge and a projection of at least 225 mm from the hinge to the opening edge:*

  - *7 kg or such higher value as, according to the manufacturer's cooking instructions, can be placed in the oven.*

Doors, except those where the lower level of the oven is above a ***hob****, having a vertical hinge are opened through an angle of 90°, and a downward force of 140 N is then applied gently to the top of the door at the extremity furthest from the hinge.*

This test is repeated with the door opened as far as possible, but not through an angle of more than 180°.

During these tests, the appliance shall not tilt.

For the weight, a sandbag may be used.

For appliances provided with more than one door, the tests are made on each door separately.

For non-rectangular doors, the force is applied to that point furthest from the hinge where such a force might be exerted in normal use.

Damage to, and deformation of, doors and hinges are neglected.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.101 Shelves shall be constructed so that they do not fall away from the shelf supports either when inside the oven or extended out by 50 % of their depth. They shall not tip when extended out by 50 %.

Compliance is checked by the following test.

Load a cake tin or similar container, having an area of 75 % of that of the shelf, with evenly distributed weights of mass of 40 kg for each square metre of tin area. Insert a shelf, with the loaded tin centrally disposed, on the supports provided in the oven. Move the shelf as far as possible to the left, leave it for 1 min and then withdraw it. Re-insert the shelf and move it to the extreme right, leave it for 1 min and again withdraw it.

During this test the shelf shall not fall away from the support.

The test is then repeated with the shelf extended out by 50 % of its depth. Then apply an additional force of 10 N vertically downward on the centre of the exposed front edge of the shelf. During this test the shelf shall not tilt by more than 10° to the horizontal.

21.102 **Hob surfaces** of glass-ceramic or similar material shall withstand the stresses liable to occur in normal use.

Compliance is checked by the following test.

Heating sources beneath a surface of glass-ceramic or similar material are operated in accordance with the conditions of Clause 11 until steady conditions are established. After switching off, the ***hob surface*** *is immediately subjected to the following test:*

A vessel having a copper or aluminium base that is flat over a diameter of 220 mm ± 10 mm with edges rounded with a radius of at least 10 mm is uniformly filled with sand or shot so that the total mass is 4 kg. The vessel is dropped flat from a height of 150 mm onto the surface.

The test is carried out 10 times on any part of the ***hob surface*** *but not within 20 mm of control knobs.*

The heating sources are then again operated in accordance with the conditions of Clause 11 until steady conditions are established.

Immediately after switching off, a quantity of $2\ ^{+0,1}_{0}$ *l of cold water at 15 °C ± 5 °C is then poured steadily over a period of 1 min over the surface; 15 min later all excess water is removed. The appliance is then allowed to cool to approximately ambient temperature. An additional quantity of* $2\ ^{+0,1}_{0}$ *l of cold water is then again poured steadily over a period of 1 min over the surface.*

Fifteen minutes later all excess water is removed and the surface wiped dry.

After the tests the surface shall not be cracked or broken and the appliance shall withstand the test of 16.3.

22 Construction

This clause of Part 1 is applicable except as follows.

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

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

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

NOTE Trip-free type is an automatic action that is independent of manipulation or position of the actuating member.

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

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

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

Compliance is checked by inspection.

22.103 Hinged lids shall be protected against accidental falling.

Compliance is checked by inspection and manual test.

22.104 **Detachable hob elements** and their supports shall be constructed so that the **hob elements** are prevented from rotating about a vertical axis and are adequately supported in all possible positions of adjustment of the supports.

Hinged **hob elements** shall be protected against accidental dropping. This requirement does not apply to hinged **hob elements** that can be opened through an angle of at least 100°.

*Compliance is checked by applying a force of 20 N in the least favourable position and direction to the raised **hob element**. The **hob element** shall not rotate or fall back to its operating position.*

22.105 In addition to the position of control knobs, if any, **induction heating sources** shall have adequate visual or audible warning that the control is in the "ON" position.

Compliance is checked by inspection.

22.106 Appliances incorporating **induction heating sources** shall be constructed so that the power input of these sources is limited to a value of 120 % of the marked or declared power input.

Compliance is checked by inspection and measurement.

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

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

22.108 **Hob elements** with **induction heating sources** shall be constructed so that the **hob element** does not operate when only a small metal object is placed on the **cooking zone**.

Compliance is checked by the following test.

*A disc of low carbon sheet steel 1,5 mm thick and having a diameter of 50 mm is placed flat in the most unfavourable position on the **cooking zone**. The controls are at their highest setting.*

The temperature rise of the disc shall not exceed 35 K.

22.109 In appliances incorporating a **pan detector**, a signal lamp shall indicate when the control for the **hob element** is not switched to the **off position**.

Compliance is checked by inspection.

22.110 Thermal controls shall not be incorporated in connectors.

Compliance is checked by inspection.

23 Internal wiring

This clause of Part 1 is applicable except as follows.

23.3 *Addition:*

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

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

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

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

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

Compliance in this instance is checked by rupturing the capillary tube in such a way that the rupture does not seal the capillary tube.

24 Components

This clause of Part 1 is applicable except as follows.

24.1.4 *Modification:*

– *energy regulators*
  • *for automatic action* *100 000*
  • *for manual action* *10 000*
– ***self-resetting thermal cut-outs***
  • *for radiant heating elements of glass-ceramic **hobs*** *100 000*
  • *for other heating elements* *10 000*

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.1 *Modification:*

Appliances shall not be provided with an appliance inlet.

25.3 *Addition:*

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

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

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

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

25.7 *Modification:*

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

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

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable except as follows.

27.2 *Addition:*

Stationary appliances shall be provided with a terminal for the connection of an external equipotential conductor. This terminal shall

– be in effective electrical contact with all fixed exposed metal parts of the appliance, except small fixed exposed metal parts such as name-plates and similar parts;

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

– be located in a position convenient for the connection of the bonding conductor after installation of the appliance.

28 Screws and connections

This clause of Part 1 is applicable except as follows.

28.1 *Addition:*

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

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

28.4 *Addition:*

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

Screws that make mechanical connections and provide earthing continuity shall be so designed that the contact pressure does not change appreciably through loosening of the screwed

assembly parts due to operational stress and contact corrosion. They shall be designed so that a minimum contact pressure remains.

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

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

Table 102 – Assembling torques for screwed connections providing earthing continuity

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

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable except as follows.

29.2 *Addition:*

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

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.1 *Modification:*

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

30.2.2 *Not applicable.*

30.101 Filters, if any, of non-metallic materials intended for the absorption of grease are subjected to the burning test specified in ISO 9772 for category HBF material, if relevant, or shall be classified at least HB40 according to IEC 60695-11-10, except that the thickness of the specimen is the same as that in the appliance.

Compliance is checked by the tests of ISO 9772 or IEC 60695-11-10.

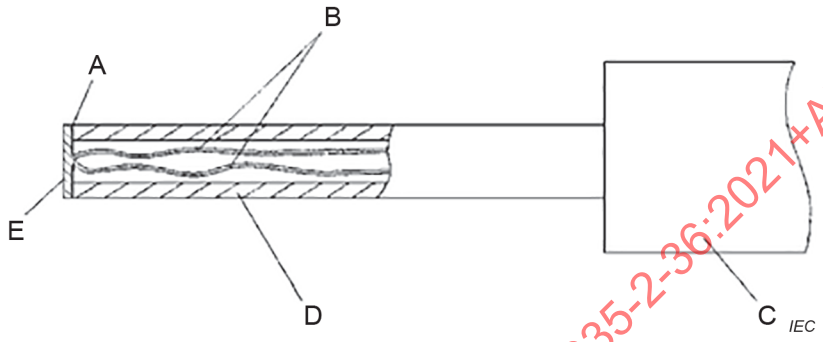
For the burning test specified in ISO 9772 it may be necessary to support the specimen.

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

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

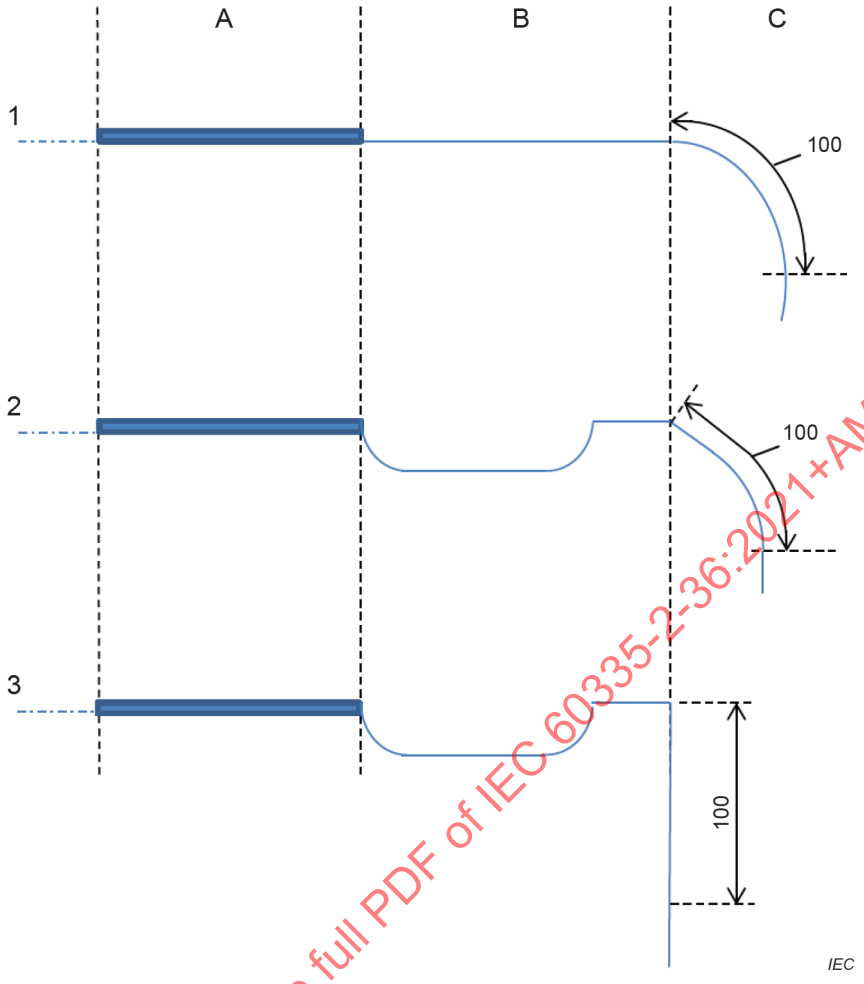
C handle arrangement permitting a contact force of 4 N ± 1 N

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

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

Figure 101 – Probe for measuring surface temperatures

Dimensions in millimetres



Key

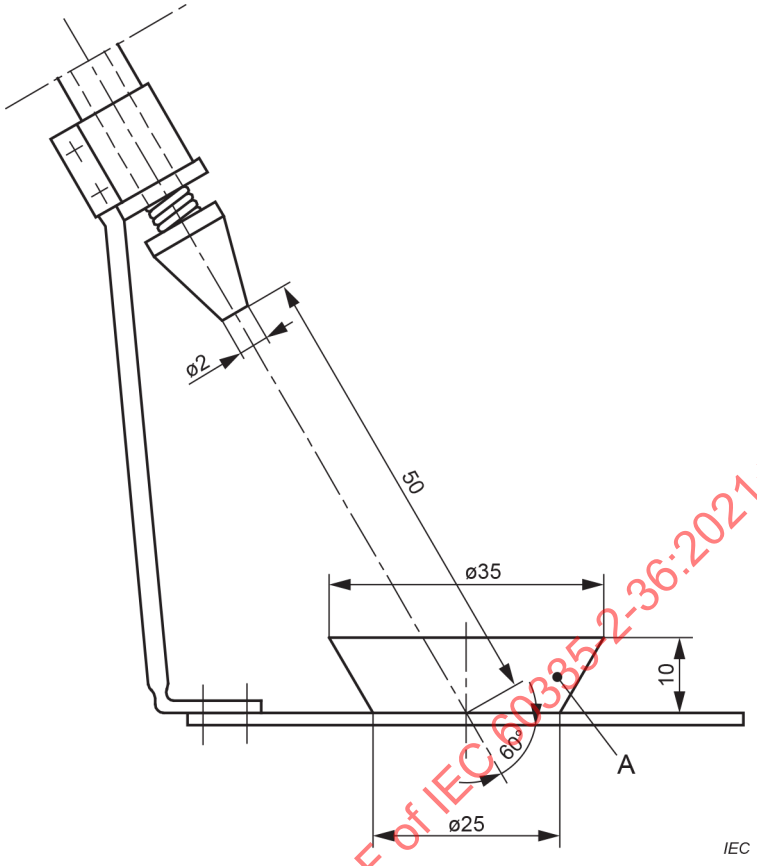
A **functional surface**

B **adjacent surface**

C external **accessible surface**

Figure 102 – Identification of surfaces for temperature measurement

Dimensions in millimetres

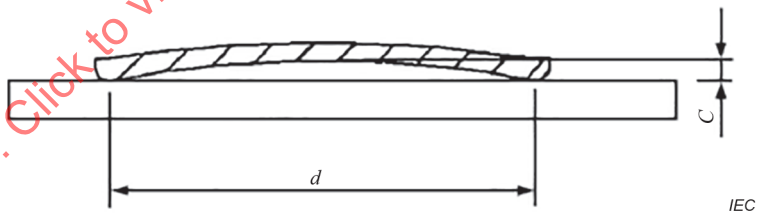


Key

A bowl

Figure 103 – Splash apparatus

Dimensions in millimetres (uncertainty ± 0,5 mm)



Key

C maximum concavity

d diameter of the flat area of the base

Figure 104 – Concavity of disc

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 not applicable.~~

Annex P
(informative)

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

Annex P of Part 1 is applicable except as follows.

13 Leakage current and electric strength at operating temperature

13.2 *Modification:*

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

– *for cord and plug connected appliances*	*0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher;*
– *for other appliances*	*0,5 mA or 0,5 mA per kW **rated power input** of the appliance with no maximum, whichever is higher.*

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

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

16 Leakage current and electric strength

16.2 *Modification:*

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

– *for cord and plug connected appliances*	*0,5 mA or 0,5 mA per kW **rated power input** of the appliance with a maximum of 5 mA, whichever is higher;*
– *for other appliances*	*0,5 mA or 0,5 mA per kW **rated power input** of the appliance with no maximum, whichever is higher.*

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

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

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60335-2-42, *Household and similar electrical appliances – Safety – Part 2-42: Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens*

IEC 60335-2-49, *Household and similar electrical appliances − Safety − Part 2-49: Particular requirements for commercial electric appliances for keeping food and crockery warm*

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

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60335-2-36 edition 7.1 contains the seventh edition (2021-12) [documents 61/6377/FDIS and 61/6427/RVD] and its amendment 1 (2025-02) [documents 61/7244/CDV and 61/7349/RVC].

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

IEC 60335-2-36 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This seventh edition cancels and replaces the sixth edition published in 2017. This edition constitutes a technical revision.

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

a) the text has been aligned with IEC 60335-1:2020;
b) some notes have been converted to normative text, modified or deleted (Clause 1, 7.1, 7.15, 11.4, 13.3, 21.101, 22.101, 27.2, 30.101);
c) conciliation of the text of IEC 60335-2-36 with other standards under IEC/TC61/MT32;
d) exclusion of battery-operated appliances and appliances used in areas open to the public (Clause 1);
e) relocation of cleaning instructions from 7.12.1 to 7.12;
f) clarification of the testing procedure in 15.1.1;
g) clarification on the test conditions in 19.1 and 23.3;
h) introduction of 22.110;
i) clarifications in the requirements in 25.3.

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

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

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

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

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

This Part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements.

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 and its amendment 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 may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

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

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs and hob elements

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electrically operated commercial **cooking and baking ranges**, ovens, **hobs**, **hob elements** and similar appliances, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances including direct current (DC) supplied appliances.

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

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

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

Attention is drawn to the fact that

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

This standard does not apply to

– appliances designed exclusively for industrial purposes;
– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
– appliances for continuous mass production of food;
– steam cookers, forced and steam convection ovens (IEC 60335-2-42);
– appliances for keeping food and crockery warm (IEC 60335-2-49);
– commercial microwave ovens (IEC 60335-2-90).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

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

ISO 185, *Grey cast irons – Classification*

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

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

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

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

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

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.4 *Addition:*

Note 101 to entry: The **rated power input** is the sum of the power inputs of all the individual elements in the appliance that can be on at one time; where there are several such combinations possible, that giving the highest power input is used in determining the **rated power input**.

3.1.9 *Modification:*

Replace the first paragraph with the following:

operation of the appliance under the following conditions:

Solid **hob elements** are operated with no load and sheathed **hob elements** are operated with a load made of dull black, cold or hot rolled steel, 9 mm to 10 mm thick, that covers not less than 90 % and not more than 100 % of the element surface. The **hob elements** are operated with the controls set to give the temperatures as set out below, the temperature being measured at the geometrical centre or the hottest point of the solid element or load, if the element is unevenly heated.

Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set at the maximum.

Non-induction heating sources beneath a glass-ceramic or similar material are operated with a pan or pans containing initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are of aluminium, of ordinary quality, not brightly polished, with a base concavity not exceeding 0,1 mm. The pan or pans shall cover the **cooking zone** to the greatest extent possible.

The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

Induction heating sources beneath a glass-ceramic or similar material are operated with the pan or pans recommended by the manufacturer.

If one pan is used, it shall cover as closely as possible, but not less than, the full area of the **cooking zone**. The pan is positioned centrally.

For non-circular **cooking zones**, a combination of the smallest number of pans is chosen to cover as much as possible the area of the **cooking zone**.

The pan or pans in each case are filled with initially cold frying oil to a height of 30 mm ± 5 mm. The controls are set at maximum until the temperature of the oil attains a value of 180 °C and then adjusted to maintain the oil at a temperature of 180 °C ± 15 °C. The oil temperature is measured 10 mm above the centre of the bottom of the vessel.

A further test is made using initially cold water, the pan(s) being filled to a height of 60 mm ± 10 mm. The pan or pans are covered with a lid. The controls are set at maximum until the water boils and then adjusted to maintain boiling. Water is added to maintain the water level during boiling.

The condition providing the most unfavourable results (oil or water) is used.

Ovens are operated with no load and with the controls set so that the mean value of the temperature over the thermostat cycle at the geometric centre of the usable space in the interior of the oven is maintained at 240 °C ± 4 °C. Stepped controls are set so that this temperature is 240 °C ± 15 °C. For ovens that are capable of attaining temperatures in excess of 290 °C, the controls are set so that the temperature is 50 °C ± 4 °C below the maximum temperature attainable. For ovens that are unable to attain a temperature of 240 °C, the controls are set at maximum.

Griddle plates are operated with no load and with the controls set so as to give the temperatures set out below, the temperature being measured at the hottest point of each controlled cooking surface. Stepped controls are set to the first position that gives a temperature equal to or greater than 275 °C. Cycling controls are set so that the mean value of the temperature over the cycle is 275 °C ± 5 °C. If this temperature cannot be reached, the control is set at maximum.

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

3.5 Definitions relating to types of appliances

3.5.101
cooking and baking range
single cooking or baking appliance incorporating one or more ovens together with one or more **hob elements** or **griddle plates** or a combination of these

Note 1 to entry: An appliance incorporating a forced convection oven, steam-convection oven or microwave oven is considered to be an appliance incorporating another appliance (see also 5.102).

3.5.102
hob
appliance consisting of a **hob surface** and one or more **hob elements**

Note 1 to entry: It may be a separate appliance or part of a **cooking and baking range**.

Note 2 to entry: A **hob** may also incorporate a **griddle plate**.

3.6 Definitions relating to parts of an appliance

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

Note 1 to entry: Examples are **hob elements**, **griddle plates** or ovens.

Note 2 to entry: If an oven incorporates more than one heating element or groups of elements that are so controlled that one element or group cannot be switched on while another element or group is energized, each of the elements or groups of elements is to be considered as a separate **heating unit** and tested accordingly.

3.6.102
hob element
heating unit designed to accommodate a vessel or vessels on its upper surface

Note 1 to entry: A **hob element** may consist of an **induction heating source** or a non-induction heating source beneath a surface of glass-ceramic or similar material.

3.6.103
hob surface
horizontal part of the appliance to which the **hob elements** are attached

3.6.104
cooking zone
area marked on a **hob surface** of glass-ceramic or similar material where the vessel is intended to be placed

3.6.105
induction heating source
heating source that operates by inducing eddy currents in a vessel positioned on the **hob element**

3.6.106
griddle plate
heating unit having a cooking surface on which the food is intended to be placed directly

3.6.107
pan detector
device incorporated in a **hob element** that prevents its operation unless a vessel is placed on the **cooking zone**

Note 1 to entry: A **pan detector** is not considered to be a **thermostat** or **protective device**.

3.6.108
functional surface
surface that is intentionally heated by an internal heat source and has to be hot to carry out the function for which the appliance is intended

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

3.6.109
adjacent surface
surface that is adjacent to a **functional surface** and which can become hot through conduction

3.8 Definitions relating to miscellaneous matters

3.8.101
installation wall
special fixed construction containing supply facilities for appliances installed in conjunction with it

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

Hob elements *that are submitted separately are tested when installed in an appropriate* ***cooking range****.*

The test of 18.102 may be made on a separate sample.

5.3 *Addition:*

The test of 18.102 is made before the test of Clause 11 unless it is made on a separate sample.

5.10 *Addition:*

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

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

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

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

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement:*

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

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

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

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

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

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

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

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

Caution: Magnetic field

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

Caution: Hot surfaces.

7.6 *Addition:*

	[symbol IEC 60417-5140 (2003-04)]	non-ionizing electromagnetic radiation
	[symbol IEC 60417-5041 (2002-10)]	caution, hot surface

7.12 *Addition:*

If the appliance incorporates a **hob surface** of glass-ceramic or similar material that provides the enclosure of **live parts**, the instructions shall include the substance of the following warning:

WARNING: If the surface is cracked, immediately disconnect the appliance or appropriate part of the appliance from the supply.

The instructions for appliances with **hob surfaces** of glass-ceramic or similar material shall state that aluminium foil and plastic vessels are not to be placed on the hot surfaces. They shall also state that these surfaces are not to be used for storage.

The instructions for appliances containing **hob elements** incorporating halogen lamps shall warn the user to avoid looking directly at the lamps when on.

The instructions for appliances containing **hob elements** incorporating **induction heating sources** shall indicate the size of the smallest cooking vessel to be used. They shall also include the substance of the following:

– metallic objects such as kitchen utensils, cutlery etc. shall not be placed on the hob surface within the cooking zones since they could get hot;
– take care when operating the appliance, as rings, watches and similar objects worn by the user could get hot when in close proximity to the hob surface;
– only use vessels of the type and size recommended.

The instructions for appliances incorporating **induction heating sources** shall state that users with heart pacemakers should consult the manufacturer, unless specific details are given.

The instructions for **hobs** with **hob elements** incorporating **pan detectors** shall include the substance of the following:

After use, switch the hob element off by means of its control. Do not rely on the pan detector.

Instructions for **user maintenance**, for example cleaning, shall also be given. They shall include a statement that the appliance is not to be cleaned with a water jet or a steam cleaner.

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

The instructions shall include the substance of the following:

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

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

Modification:

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

7.12.1 *Addition:*

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

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

In addition, for appliances incorporating **induction heating sources**, the instructions shall state that any repairs shall be carried out only by persons trained or recommended by the manufacturer.

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

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

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

7.12.4 *Addition:*

– for appliances incorporating **induction heating sources**, a warning that care be taken to ensure that the splashback and surrounding area are free of metallic surfaces, if this is necessary due to the design of the appliance. The instructions for **built-in appliances** having a separate control panel for several appliances shall state that the control panel is only to be connected to the specified appliances in order to avoid a possible hazard.

7.12.9 Not applicable.

7.14 *Addition:*

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

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

7.15 *Addition:*

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

Modification:

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

7.101 If, during the test of Clause 11, the temperature rise of the side and rear walls of the test corner above the level of the **hob surface** exceeds 65 K or during the test of Clause 19 the temperature rise of the walls above and below the **hob surface** exceeds 125 K, the installation instructions provided by the manufacturer shall include the substance of the following that shall also be included on a permanent label, attached to the appliance.

Where this appliance is to be positioned in close proximity to a wall, partitions, kitchen furniture, decorative finishes, etc., it is recommended that they are made of non-combustible material. If not, that they shall be clad with a suitable non-combustible heat-insulating material.

Compliance is checked by inspection.

7.102 The **cooking zones** of **hob surfaces** of glass-ceramic or similar material shall be clearly identified by appropriate marking, unless they are obvious.

Compliance is checked by inspection.

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

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

Compliance is checked by inspection.

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.1 *Addition:*

Appliances intended to accommodate detachable **hob elements** shall be constructed so that there is adequate protection against accidental contact with **live parts** during insertion or removal of these elements.

8.101 Heating elements that are liable to be touched accidentally by a fork or similar pointed object in normal use shall be so protected that it is not possible to touch their **live parts** with such an object.

Compliance is checked by inserting test probe 12 of IEC 61032 at all points where the probe can enter in the vicinity of live parts.

9 Starting of motor-operated appliances

This clause of Part 1 is applicable except as follows.

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

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

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

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

The tests are carried out three times.

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

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Modification:*

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

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

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

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

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

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

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

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

10.2 *Modification:*

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

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

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

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

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

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

11 Heating

This clause of Part 1 is applicable except as follows.

11.2 *Addition:*

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

11.3 *Addition:*

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

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

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

11.4 *Replacement:*

The non-induction heating units of the appliance are operated under normal operation at 1,15 times the power input marked (see 7.1).

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

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

*If it is not possible to switch on all heating elements or **induction heating sources** at the same time, the test is made with each of the combinations that the switch arrangement will allow, the highest load possible with each switching arrangement being in circuit.*

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

*In addition, appliances incorporating **induction heating sources** are also operated as above, but with the smallest size of pan as recommended by the manufacturer placed in the most unfavourable position consistent with being able to energize the coil, but within the **cooking zone**. This operating condition is not applied when reference to Clause 11 is made in other subclauses.*

11.7 *Modification:*

Replace the first paragraph with the following:

Appliances are operated until steady conditions are established.

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

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

11.8 *Modification:*

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

Addition:

*The limit of 65 K temperature rise for the rear and side test walls, including the part of the test corner that projects in front of the appliance, only applies below the level of the **hob surface**. If this temperature rise limit is exceeded above the **hob surface** then the instructions in 7.101 shall be provided.*

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

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

[a] *Temperature rises are not measured on:*
- *the underside of appliances intended to be used on a working surface or floor;*
- *the rear surface of appliances;*
- *surfaces that are inaccessible to a 75 mm diameter probe having a hemispherical end;*
- *the area up to 60 mm around a heated cavity door opening;*
- ***functional surfaces*** *and* ***adjacent surfaces****.*

[b] *The temperature rise on external accessible surfaces up to a distance of 100 mm from* ***adjacent surfaces*** *of the appliance (see Figure 102) may exceed the limits by up to 25 K, but the relevant part shall then be marked with symbol IEC 60417-5041 (2002-10) or the equivalent text.*

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

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

[e] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*

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.

13.1 *Modification:*

The appliance is operated under the conditions specified in Clause 11 until the leakage current has reached a steady value or for the duration specified in 11.7, whichever is the shorter period.

If more than one pan is placed on a single cooking zone, they are electrically connected together.

13.2 *Modification:*

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

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

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

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

13.3 *Addition:*

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to earthed metal.*

*A test voltage of 1 000 V is then applied between **live parts** and the pans.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.*

*A test voltage of 3 000 V is then applied between **live parts** and the pans.*

During the test care shall be taken to avoid overstressing other insulation.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.1 *Addition:*

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

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

For appliances normally used on the floor, the bowl is placed on the floor and is moved around in such a way as to splash the appliance from all directions. During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl. The bowl is not positioned underneath the appliance.

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

Care is taken that the appliance is not hit by the direct jet.

15.1.2 *Modification:*

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

Addition:

*If detailed instructions regarding the cleaning of movable but non-detachable (for example hinged) **hob elements** are given in the instructions, tests on these **hob elements** are carried out with the elements in the horizontal position of normal use.*

15.2 *Addition:*

*Appliances are positioned so that the **hob surface** is horizontal and if the **hob elements** are adjustable separately, their surfaces are also horizontal.*

*A vessel having a diameter equal to or not more than 25 mm smaller than the largest inscribed circle on the **hob element** or **cooking zone** is completely filled with the spillage solution and placed in the most unfavourable position, not overlapping the **hob element** or the **cooking zone**.*

A further quantity of the spillage solution equal to approximately 2 l is poured steadily into the vessel over a period of 1 min.

*The test is made on each **hob element** separately, the tray or other receptacle being emptied each time.*

For appliances incorporating ovens or grills, the spillage test is made by pouring steadily over a period of 1 min approximately 1 l of the spillage solution over the bottom surface of the oven or grilling compartment.

*For appliances incorporating **griddle plates**, approximately 1 l of the spillage solution is poured steadily over a period of 1 min onto the centre of the surface of the **griddle plate**.*

*If controls are mounted in the **hob surface** of the appliance, 1 l of the spillage solution is poured.*

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

Compliance is checked by the following test.

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

16 Leakage current and electric strength

This clause of Part 1 is applicable except as follows.

16.1 *Addition:*

*For appliances provided with **hob surfaces** of glass-ceramic or similar material, the tests of 16.2 and 16.3 are made with a pan or pans as described in 3.1.9.*

*If more than one pan is placed on a single **cooking zone**, they are electrically connected together.*

16.2 *Modification:*

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

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

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

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

Addition:

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured for each of the cooking zones in turn, only the pan(s) concerned being connected to earthed metal.*

*The leakage current shall not exceed 1 mA per kW of the power input of the **heating unit** being tested.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, the leakage current is measured between **live parts** and the pan(s) for each of the **cooking zones** in turn, the pan(s) concerned not being connected to earthed metal.*

*In addition, the leakage current is measured between **live parts** and a probe consisting of a flat metal disc 50 mm in diameter. The probe is placed in all positions on the **hob surface** outside the **cooking zones**, the pans remaining in position.*

For each measurement, the leakage current shall not exceed 0,25 mA.

16.3 *Addition:*

*If there is earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together and to the earthed metal.*

*A test voltage of 1 250 V is then applied between **live parts** and the pans.*

*If there is no earthed metal between **live parts** and the surface of glass-ceramic or similar material, all the pans on the **hob surface** are electrically connected together, but not connected to earthed metal.*

*A test voltage of 3 000 V is then applied between **live parts** and the pans.*

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is applicable except as follows.

18.101 Appliances incorporating **induction heating sources** shall be constructed so that, in normal use, there is no failure that impairs compliance with this standard. The insulation shall not be damaged and connections shall not work loose.

*Compliance is checked by energizing each **induction heating source** 100 000 times by moving the smallest pan recommended by the manufacturer (or an equivalent metallic object) on and off the **hob element** at a rate of six times per minute (5 s for each movement). The test is made at the least favourable voltage as determined in Clause 11.*

18.102 Appliances incorporating surfaces of glass-ceramic or similar material shall withstand thermal stresses liable to occur in normal use.

Compliance is checked by the following test:

*The appliance is operated with all heating sources beneath the glass-ceramic or similar material energized at the same time. Non-induction heating sources are operated with a pan filled with water according to 3.1.9 but placed in the most unfavourable position on the **cooking zone**. **Induction heating sources** are operated with an empty pan.*

*The controls are set at maximum and the appliance is operated for 500 cycles, each cycle comprising 10 min on and 20 min off, the supply being 1,1 times the **rated voltage**. The operation of thermostats or temperature limiters during the test is ignored.*

*Immediately after the last energized period, the pan(s) is (are) removed and the **hob surface** is subjected to a spillage test using $2\,^{+0,1}_{0}$ l of cold water between 10 °C and 15 °C, poured steadily over the surface for 1 min.*

Fifteen minutes later all excess water is removed from the surface.

After the test, the surface shall not be cracked or broken and the appliance shall withstand the test in 16.3.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Modification:*

Instead of the first paragraph of the test specification, the following applies.

All appliances are subjected to the tests of 19.2 and 19.3.

In addition, appliances provided with a control limiting the temperature during the tests of Clause 11 are subjected to the test of 19.4 and, where applicable, to the test of 19.5.

*Appliances incorporating **PTC heating elements** are also subjected to the test of 19.6.*